What's in this issue—

Edward J. Mehren

When President Roosevelt's committee of nine to study British and Swedish labor relations gets to work it will discover that the British don't think so much of compulsory arbitration. Edward J. Mehren, a former McGraw-Hill vice-president, contributes **a comparison of British and American practice** and tendencies in labor relations. Read it on page 673.

C. W. Hinman employs the same time-saving approach to the "**Press Working of Metals**" that he used in a previous series on "Practical Steps in Tool Design" which appeared last year. He discusses underlying principles and illustrates them with practical applications. First installment of his new series begins on page 684.

New refinements are frequent but new principles are rare in the development of metal-cutting methods. However, Dave Wallace, of Chrysler, really seems to have **something different in his Superfinishing process.** The story is on page 678.

For the first time, we believe, **flame hardening has been applied to bed ways.** Monarch is doing it, and how is told on page 682.

Like machine tool operations, **forging has advanced in scope and precision.** A notable example is the shoe for Model E Cleveland tractor. A picture story (page 676) shows how it's done.

Model building is a time saver in radio manufacture. R.C.A. finds that it aids both development of design and layout of shop operation. A description of this company's model department appears on page 689.

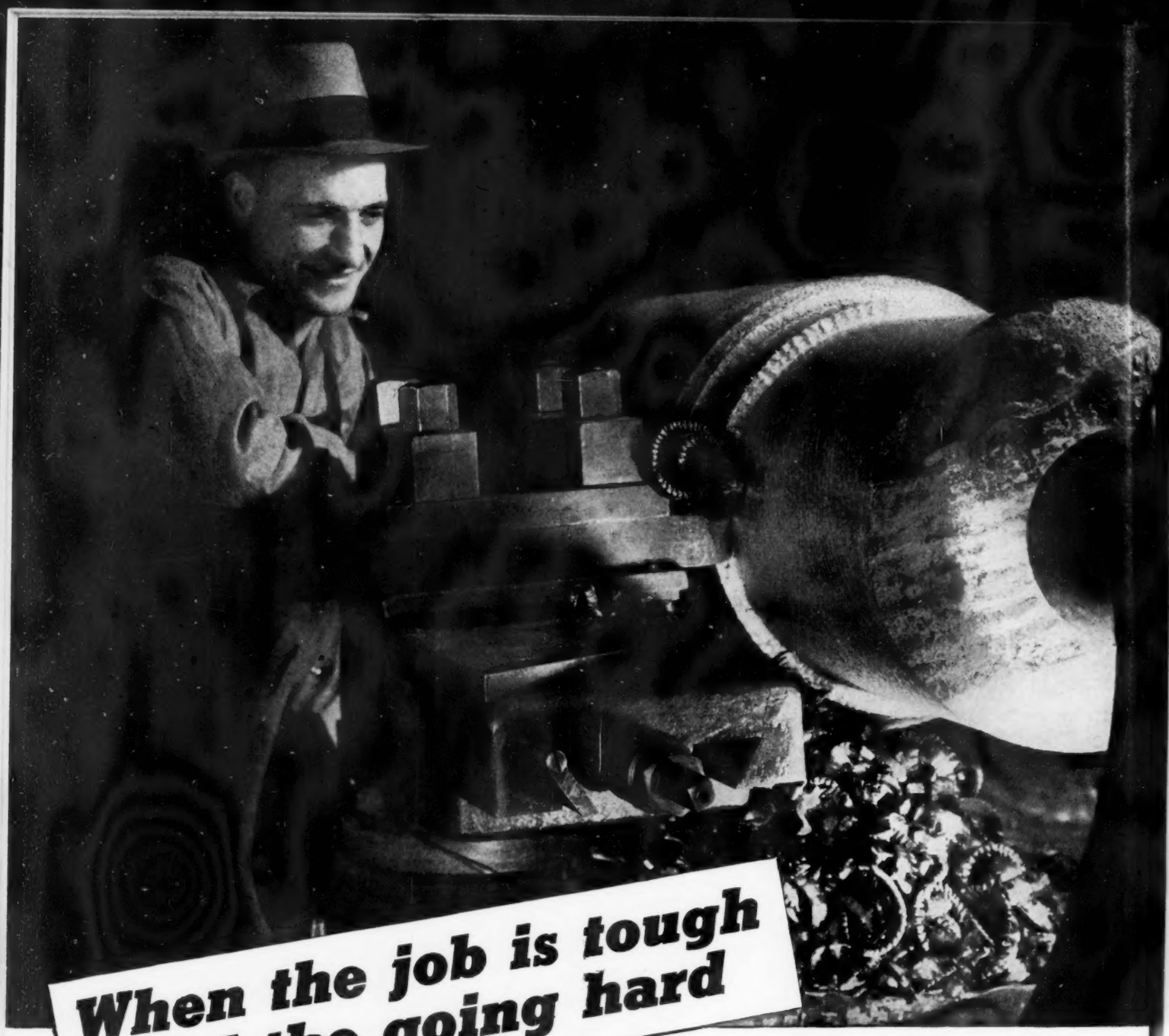
This week **Dad Says** that it's pretty hard for outsiders to judge shop conditions. He compares the impressions of visitors with the workers' knowledge of actual facts on page 681.

COMING

Of all metal construction, this newest Ryan plane is largely assembled of stampings from drop hammers

Airplane production has reached a point where mechanical means are useful in forming sheet-metal members for the wings and fuselage. At the present state of development, the drop hammer has proved to be an economic tool for this service. As applied to aircraft, use of the drop hammer calls for new technique. Accordingly we asked Fred A. Rohr, of the Ryan Aeronautical Corporation and an acknowledged leader in this field, to give us an article on the subject. Look for it in our next number.

Whether it's the heat or the humidity, Congressmen get hot in Washington—that is, they did until the York Ice Machinery Company completed the Capitol air-conditioning system. How some of the compressor parts that went into this set-up are machined will be shown soon. If the servants of the people get hot now they'll have to blame it on internal combustion.



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AMERICAN MACHINIST

ESTABLISHED 1877

F. H. COLVIN • K. H. CONDIT • BURNHAM FINNEY, Editors

By Guess or By Test?

HOW MUCH of the machinery we buy, or make, the materials we use, the designs we develop is really tested so that we know what we are doing? And how much of it do we accept or recommend on guesswork?

Admitting at once that there are outstanding exceptions let us be frank and acknowledge that we don't know nearly as much as we should about the physical properties of materials and the performance characteristics of our machines. A technique has been worked out for checking by scale models the theoretical calculations involved in bridges, dams and drydocks—structures so large and expensive that an error would be fatal—but designs of moderate size seldom get more than a trial and error checking.

To answer the many questions on properties of materials that come in daily to the Bureau of Standards one of its engineer physicists compiled Circular 101, "Physical Properties of Metals," from the available literature. Examination of this interesting document shows that perhaps two-thirds of its columns are blank. The chances are that many of the figures that are given are not reliable because they were not determined in the same way for all metals.

Here is a vital need that could be met by a very modest appropriation of government funds. It is at least as important as the completion of the maps for the whole United States, a project on which some progress has been made.

Machine tools are pretty carefully checked before they are shipped but we wonder how many of them get a full load test either by the builder or the customer. It wasn't so many years ago that one builder started making full load tests with strain gages applied to various parts of the machine. The result of the first tests was a general redistribution of metal. Some parts were not heavy enough, others far too heavy. Yet this machine was successful according to accepted standards, it was behaving well in the hands of customers.

There is a strange apathy toward physical testing. Many a college engineering laboratory could make a real contribution to our knowledge of the properties of materials, and at the same time provide valuable training and experience for its undergraduate and graduate students. The majority of the tests that ought to be made require only the simplest of apparatus.

ON THE OTHER hand there is that room that was set aside for machine tool research when Lehigh opened its beautiful new engineering building several years ago. So far as we know it is still marked "Machine Tool Research," and is still empty because no machine tool builder has ever been willing to contribute a machine tool for research purposes.

Probably we can get along on the present basis and hold our own as long as England and Germany are too busy or too poor to carry on much original research, but the day will come when they have caught up on rearmament. Then we may wish we had been a little more energetic.

Gaging Business

BUSINESS in the metal-working industries is mending slowly. Though sales in many lines reflect the languid influence of the summer season, inquiries are more numerous and fall prospects are encouraging. Machine tool bookings again have been supported by foreign orders, mostly from Russia and Japan. Domestic quotations, particularly to government arsenals and shipyards, are more active.

Retail car sales in July were close to the June total and the automobile industry is convinced that fall demand will be better than earlier anticipated. Meanwhile August will be the lightest production month of the year because of shutdowns for retooling. The steel rate has been stepped up to the highest point since last fall, with mills operating this week at 37.0%. Shipbuilding has been given a tremendous impetus by awards for construction of eight vessels, four for the navy and four for American Export Lines, at a cost of $30,535,000. Airplane makers continue fully occupied and backlogs are the largest on record. Farm implement companies are seasonally quiet, but look for substantial sales this fall. Electrical equipment manufacturers report increased orders. Business Week's Index of Business Activity stands at 61.7 or the same as it was two weeks ago.

NEW ENGLAND—Equipment inquiries have increased. Substantial orders from government shipyards and arsenals are expected this fall; quotations are now being made on this prospective business. Woolen textiles and leather industries are picking up, and institutional building is active. Boston Elevated will buy several cranes for Everett shops to be completed next year. Textile machinery sales have increased.

PITTSBURGH — Steel operations have advanced steadily since the July Fourth week and mills are expecting a further gain in the early fall. Automotive companies should be in the market next month. Westinghouse Electric is reported to have had an upturn in sales recently. Rolling mill machinery builders are running on a lesser schedule than earlier in the year with the outlook for new business not too hopeful. Machine tool orders and inquiries remain pretty flat.

NEW YORK—The Japanese have awarded contracts for $1,500,000 of machine tools to American builders. Domestic sales have picked up, and a good number of quotations have been sent out. It is expected that July will be a little better than June. Navy Yard business will not be available for bidding purposes until the middle of August. Philadelphia is encouraged by orders from the Federal Government, but otherwise industrial operations are slack.

CHICAGO—Business sentiment continues good. Steel output is up a bit, with support chiefly from the construction field and from miscellaneous buyers. Farm implement companies are in their slack season. The only International Harvester plant not affected by summer shutdowns is the East Moline Works. The Fort Wayne and Springfield Truck manufacturing plants will be down the first two weeks in August. The upward trend in automatic coal stoker sales may carry the total up to the 1937 level. Waukesha Motors is understood to have received an order for 50 air-conditioning units from Greyhound Lines. Flat glass manufacturers report better sales the past 90 days. Machinery orders show a slight improvement.

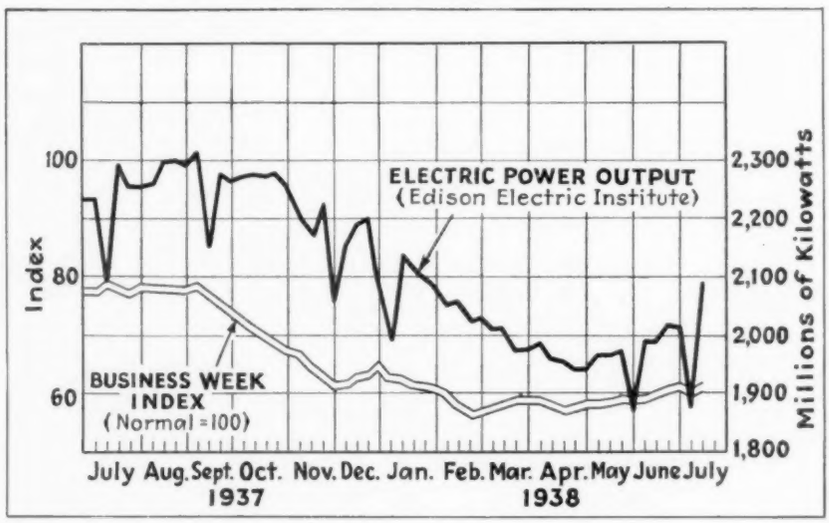
CINCINNATI—Except for foreign orders placed the past month, machine tool bookings have been the slimmest of the year. A few companies have enough business to operate at capacity the next few months, but others are working only 20 to 30 hours a week. Indianapolis reports increased machinery orders and inquiries from the automotive, refrigeration, glass and household appliance industries.

DETROIT—Machinery orders are a little better, partly due to purchases for two plant additions locally. The tool supply trade reports more items in demand and slightly larger quantities specified. Car makers have scant inventories which soon must be replenished. Toledo expects improvement in industrial operations about Aug. 1.

LOS ANGELES—Machine tool men feel that failure of orders to turn upward strongly bears out the theory that the recent stock market rise was an adjustment from an abnormal low. Southern Californians are less inclined than ever to expect the region's inherent growth to neutralize nationally poor business. On the other hand, industrial activity in the far west has dropped less than the national dip.

POWER OUTPUT VS. GENERAL BUSINESS

A sharp gain in electric power output has put the industry back where it was during the early months of 1938, and augurs well for continued improvement of general business



U. S. employers fear that the present trend will lead to a point where labor will tell them how to run their plants

Bargaining the British Way

Neither the British employer nor the British worker wants to let government bureaucrats mix into labor negotiations

EDWARD J. MEHREN
Past President, Portland Cement Association

AMERICA, it must be plain, must soon make choice between voluntary and compulsory systems of labor negotiation and adjustment. Already we are set in the compulsory direction—in the Wagner Act and in our railway labor conciliation—with much turmoil and employer unhappiness in the former, and packed results in the latter.

Do we want an extension of these methods, or are we employers quickly to change our front and welcome and encourage a system of voluntary agreements?

In making our momentous decision the experience of Great Britain should be helpful. There they have voluntary agreements. How do they work? What do employers and employees say about them?

The answer is unanimous: employers and unions fully agree that voluntary agreements *do* work. Both sides are satisfied with them and are vigorously opposed to compulsory systems and government intervention.

What Is the British System

Before analyzing these attitudes it is desirable to set down briefly the system employed in England. It is one of "collective agreements," that is, of agreements made by an organization or organizations of employers on the one side and the union or group of unions on the other. A single employer rarely makes his own independent agreement with the union. Therefore, there is no process of the union getting better terms from one company than from others and then using those terms as an argument for concessions from the rest.

As negotiations and agreements are voluntary so is the mechanism for settling differences. Side by side with agreements as to hours, wages, overtime payments and working conditions, are schemes for bringing up, considering, adjusting and settling complaints, grievances and violations of agreements. Settlement in the plant is always preferred. Should that fail the difference goes before a city-wide or district conference, with equal representation of employers and workers. If again there be failure the issue goes to a conference representative of the national organizations of the respective sides. In the vast majority of cases differences do not get beyond the plant.

It is to be noted that up to this stage there is no interposition of government.

Government Agencies

If the national conference fails to compose the difference or there is promise that that will be the result, the Minister of Labour can suggest recourse to one of a number of types of adjusting mechanism which have been made available by law. He can propose a conciliator, a single arbitrator, an arbitration board or reference to the Industrial Court. But mind you, he can only propose. Use of any one of the mechanisms is dependent on the consent of *both* parties. Therefore, while legally established machinery is available if the voluntary mechanism is unsuccessful, it enters the case not automatically nor by legal compulsion, but *only if the disputants accept it.* Therefore, the voluntary feature is retained.

Agreement to accept one of the arbitration methods obviously implies the intent of both parties to accept and abide by the decision. As a matter of fact, the decision *is* always accepted. Refusal would be considered an appalling breach of faith. But note this clearly: The decision cannot legally be enforced. If either party refuses to accept the decision it cannot be compelled to do so. *The voluntary principle is maintained even down to the last step in the mechanism.*

Courts of Enquiry

If the parties cannot reach agreement through their voluntary adjustment systems and refuse to employ one of the legally available settlement mechanisms and if, in his judgment, the public interest is involved, the Minister of Labour can, without the consent of the parties, appoint a Court of Enquiry to investigate the circumstances of the dispute. The court, however, does not make a decision. Its purpose is to ascertain the facts for the benefit of the public, in order that public opinion may be focused on the issue. The court's report is submitted to both Houses of Parliament and is published by the Minister. But again the voluntary principle is retained. Courts of Enquiry, it should be added, are of infrequent appointment.

While a difference is in process of settlement by agreed machinery it

is generally accepted that there should be no stoppage of work, either by strike or lockout. But once the agreed machinery has been exhausted, either side can stop. Therefore, the strike or lockout is the ultimate sanction of the voluntary system. "An occasional stoppage may not be without benefit," remarked one industrialist, "for it is notice to both parties that absence of reasonableness will result in the loss of wages to employees and of production to the employers—and those are the last things that the respective parties want."

Trade Boards

The British are a practical, a realistic people. They believe in the voluntary system. They stoutly oppose government intervention. But if, in special cases, the voluntary system cannot be applied they do not tolerate a bad situation merely because it is not solvable by the chief and most favored method. It was clear a generation ago that there was sweating in the trades where unionism was weak. Public opinion stepped in and in 1909 the Trade Board Act was passed, whereby the Minister of Labour was empowered to appoint a trade board for any industry in which, in his judgment, the rate of wages prevailing was exceptionally low. By a further act, in 1918, the power to appoint trade boards was widened to include any trade where there was no adequate mechanism for determining, and seeing to the payment of, a fair wage. The trade boards so appointed determine minimum wages, which, upon approval by the Minister, must be paid by all employers in the trade. The wages are policed by inspectors of the Ministry of Labour.

There is another partial exception to the generality of voluntary agreements—a combination of voluntary and of compulsory action. It consists in the legal enforcement of voluntary agreements. It is still experimental, and applies only to cotton weaving in a circumscribed territory and to wages. The law was enacted on the joint request of the employers and the unions.

So much for the broad outlines of the British negotiation and adjustment mechanism. Two other pertinent observations are desirable before turning to a discussion of results.

First, labor is more highly organized here than in America. The figures are given in the accompanying table.

	Members Gainfully Employed	Union Membership
U. S. A.	49,000,000	7,000,000 (?)
Great Britain & Northern Ireland	21,000,000	5,300,000

The United States has 2⅓ times the working population of Great Britain and Northern Ireland. If it had the same degree of unionization it would have over 12,300,000 trade union members. Unionization in the U. S. is one in every seven of the gainfully employed; in Great Britain, one in every four. It is pertinent to add that Great Britain has a much higher degree of unionization than we in the white collar group.

To be noted, too, is this, that there is no breach, as in the U. S., between craft and industrial unions, through in some cases there is overlapping and some contest as to which union shall enroll the men in a given industry. But, in general, both live happily together in the Trades Union Congress, the great central body.

The second comment is that American employers, quite commonly, are misinformed about the legal responsibility of British Unions. It is assumed that they can be held liable for losses incurred by employers as a result of legal strikes. That is not correct. They *are* liable for damages in illegal strikes, and leaders who plan or encourage such strikes incur criminal liability as well. Strikes are illegal if they have some object other than the correction of a dispute in the industry and *at the same time* are designed to coerce the government.

System a Success

The voluntary system of Great Britain is definitely a success. Unions declare that it has got a lot for them, as much as they could hope to get by any alternative system that they have been able to conceive. They admit that there are still hard employers who would grind their workers if they could, but they declare that the large employers, whose leadership makes employer policy, are fair and reasonable.

To be noted is this: that the emotional phase of negotiation has long since disappeared in British labor relations. Now, and for many years past, negotiation is and has been on the basis of fact. All of the larger unions have research departments which constantly study the statistics of their respective industries and, so far as obtainable, the annual financial reports of the companies engaged therein. Every employer interviewed testified to the ability as negotiators of the labor representatives, whilst one vigorous industrialist, who has long conducted national negotiations for two of Britain's half dozen largest industries, stated with deliberation that "many employers, sitting in negotiations, had been forced to a closer study of their own figures and businesses by the challenging questions of labor negotiators."

Employers' Reactions

On the employers' side there is testimony that labor leaders are fair and will accept conclusions evident from the facts. An example: I asked two officers of a large industry whether, in view of wage and other concessions, they had paid too high a price for industrial peace. One of the officers replied that in certain of their export items they are dangerously near the limit of what they could grant. I then asked "Will labor leaders, on a showing of those facts, withdraw future increased demands?" There was an instant and emphatic "Yes" from both officers, and there was not a split-second between their replies.

Each side, too, testifies to the scrupulous observance of agreements by the other. One employer described it as "almost fanatical loyalty to agreements," on the part of labor. An exception to this loyal observance was during the General Strike of 1926 when the fabric broke in many directions. Observance is, of course, made possible because the union leaders have firmly established themselves with their members and are certain that their actions will be supported. Unauthorized strikes do occur but normally affect only individual companies, rather than tying up an entire industry.

In America, probably most employers have a deadly fear of unionization, particularly if their plants are not now unionized. That is why they have fought unionization. That is why the U. S. has the Wagner Act; labor determined to get by law what it could not get by negotiation. For this reason it is well to examine certain of these fears and to see whether they have been realized in British experience.

First, U. S. employers fear that "labor will run our plants," that is, that it will substitute its discipline for the employers' discipline, that it will dictate terms incompatible with smooth operation and efficiency. (It

surely has done that in some American industries: coal mining before the war, the sit-down strikes in many plants in recent years.)

The British experience is that the unions have not "run the plants." At times their demands, if granted, would have trespassed on the domain of management. But firmly resisted, the denial has been accepted by the unions. It is a cardinal principle with British employers that factory management and discipline are their jobs and are not to be invaded.

Bound up with this question is that of the closed shop. Naturally the unions want it. In some industries they have it; in most, they have not been successful. Quite generally, employers take the position that it is not their job to recruit members for the union. They insist on hiring any desirable applicant, but, as can be inferred from previous paragraphs, they make no objection to union effort to get the non-union newcomer to join up.

In Great Britain, a single employer rarely makes an independent agreement with a trade union. He operates in cooperation with his trade association

The check-off is unknown in Great Britain. In fact, it is illegal to make deductions from wages, except for payment of various insurances.

Our next American fear is restriction of output, and, in the replies to questions under this head, the present inquirer had a distinct surprise. "Go-slow," "ca-canny" have been traditional, or so it seems to the writer, in British industry. He expected to be told that restriction of output was quite common on time-payment jobs. Not so. One and all employers testified either that there was *no* restriction or that it was negligible.

Next, we fear union resistance to improvement of processes, new machinery, piecework, and all the methods of scientific management. British labor, of course, looks on some of these with a wary eye. It knows the labor-displacing effect of elaborated machinery. But it knows, too, through its long education in the economies of industry over the negotiating table and through its researches, that an ascending standard of living is possible only by augmenting income per worker—by having a bigger pot to divide. Therefore, it no longer opposes the introduction of labor-displacing machinery, but insists, first, that labor share in the fruits of the lower production cost and, second, that the introduction be in such wise as to cause as little hardship as need be to the workers affected.

We fear, too, that where unions are strong, wages, in particular, will not be flexible, that in a severe depression they cannot be brought down and, by contributing to a lowering of cost, enable the product to move in a market of lowered purchasing power. Britain had some such difficulty in the post-war depression, resulting in more strikes than usual, but it had relatively little difficulty in the 1929 depression. Union leaders here are realistic. They have had an economic education, practical if not theoretical, and did assent to necessary reductions. They didn't like them—who does?—but they realized that the alternative might be inability to sell the product and consequent closure of the plants.

Again we fear the constant pressure of the unions. "A labor leader must constantly be getting something for his members. Otherwise he can't hold his job,"—so runs our expression. Many employers in Britain were asked whether that was the British experience. They answered that that was the experience in the early days of trade union effort; not now. In the early stages labor was not well treated. There was much ground to be covered to raise standards to decency levels. With a large area demanding change, naturally the union leaders gave themselves, and the employers little rest between one concession and a new demand.

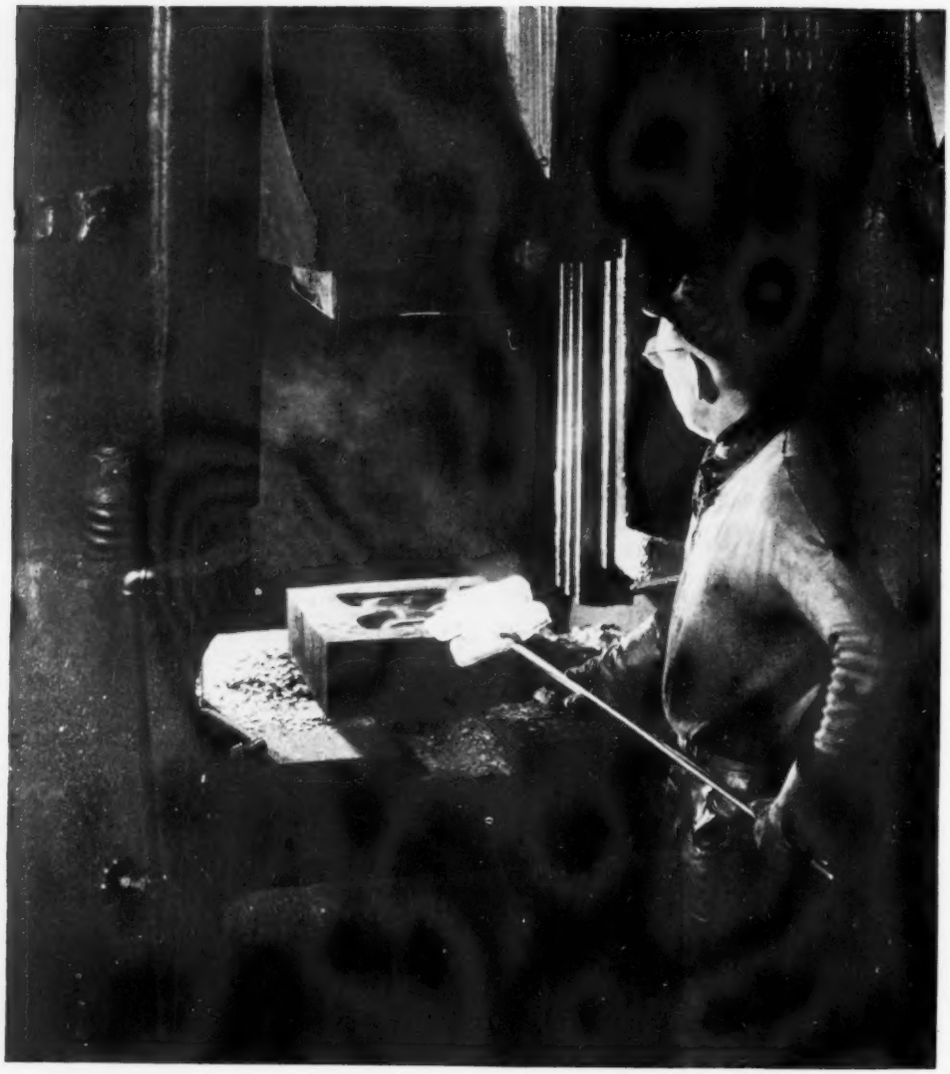
Now, the situation is different. On the whole, conditions of employment are much better—wages, hours, working conditions. There is less complaint amongst the workers; therefore, less pressure on leaders. Moreover, the leader still does much for his men. It may not be in repeated major advances, but in what one might call the service work of getting prompt settlement of complaints on minor but upsetting matters.

Then again, the education of the workers has gone hand in hand with that of the leaders; they have learned that they cannot expect their leaders to get unreasonable concessions.

Types of Labor Leaders

Finally, and for the reasons already detailed, we fear contact with union officials; we dislike dealing with men whose early argument, at least in the more recently organized trades, is a figurative club—their ability and willingness seriously to interfere with our operations, to stop them, unless they get their way. We do not hesitate to meet, even to fraternize with, our aggressive competitors; we dislike dealing with men whose argument is force. (Of course, and happily, this is not the universal type of labor leader in the United States. We have factual negotiators as well.)

What is the British experience? They had this type in the early days. In some trades those early days are so long past that no one active to-day in labor or management has had personal experience with them. In other trades, the change in type came about at the beginning of the century; in fewer still, after the war. As one employer put it, "It took 30 to 50 years for the negotiating, sane type of union leader to come to the top. We're at least a generation ahead of America in this respect."



(Left) First hammer operation is to form a blank, as shown, from a ½ x 8 x 8½-in. piece of S.A.E. 1045 steel. A single impression die is used

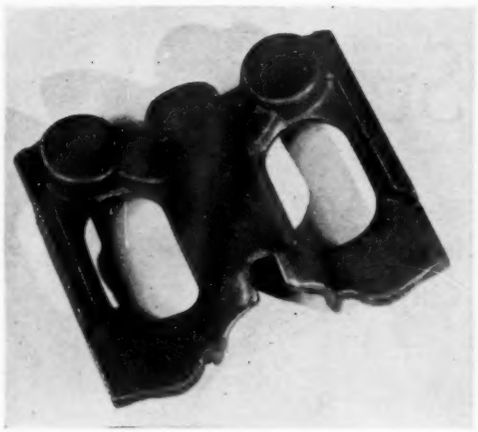
(Right Opp.) Next, the intermediate shape shown here is formed in a second hammer die set. The round center bosses, half round center and raised flat edges are formed at the same time. The piece is shown after flash has been trimmed and holes have been punched

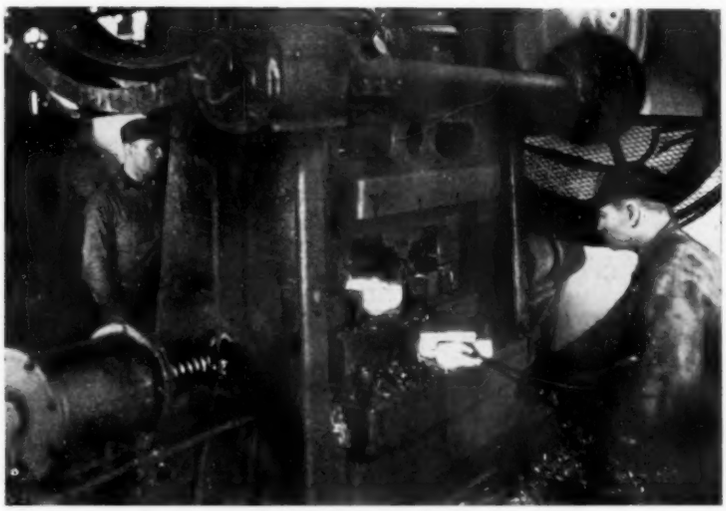
(Below) Flash is trimmed from the intermediate shape in this press. The operator is holding the flash trimmed from the outside of the piece; slugs punched from the two holes are kicked out of the die automatically

(Below Opp.) The half-round center of the blank formed in the second hammer operation contains the metal that will form the face of the shoe after the sides have been folded down in this press. Blanks first are reheated then placed in these dies, which act from the top and both sides to fold down the sides and straighten the face

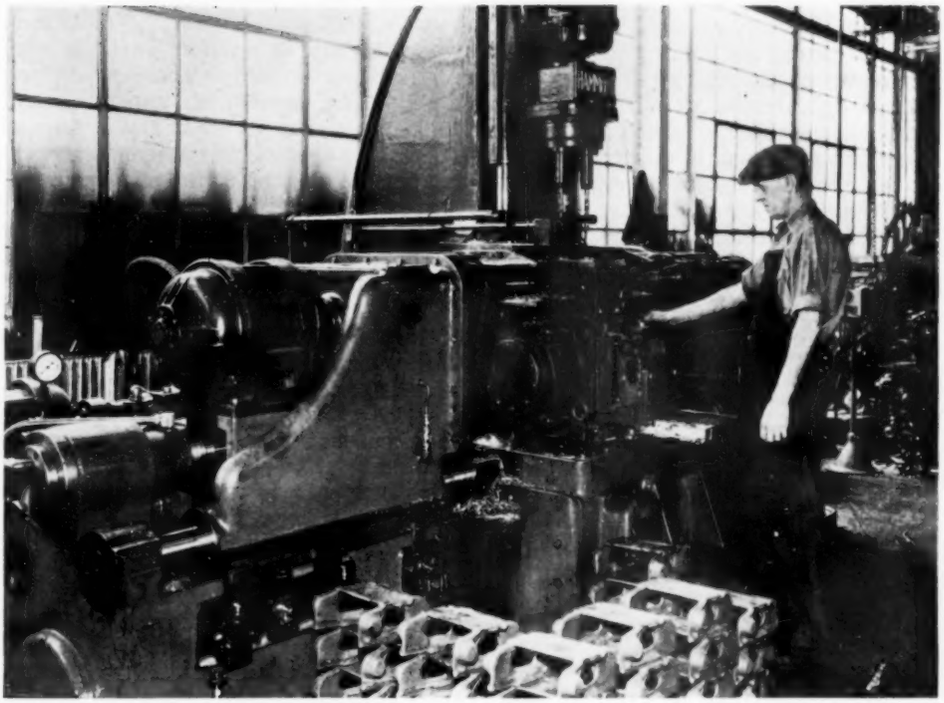
FORGING A TRACTOR SHOE

TEN YEARS ago, if a drop forge man had been asked to make a piece like this tractor shoe, the chances are he would have said it couldn't be done. But forging men have learned much from the methods used by sheet-metal workers in coaxing metal into unheard of shapes, and this one-piece shoe for a 20-hp. Model E "Cletrac" is a good example of the changes that have taken place. This piece now is produced under a drop hammer.



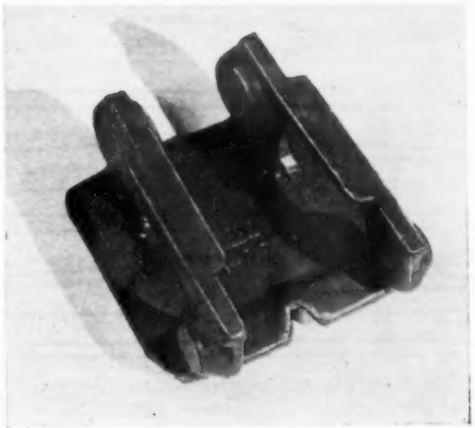


(Upper Right) Forged and folded shoes are sized in this press before being allowed to cool before delivery to the machine shop. Two men operate this machine, one at the front and one at the back to remove the piece from the dies



(Right) This drilling machine, which is hydraulically-fed, machines the tractor shoes. There are four spindles in each head and the trunnion-type fixture has four positions

(Lower Right) Following the drilling operation the shoe, shown here undrilled, is delivered to a pusher-type electric furnace for heat-treating. Shoes are ejected from the furnace into a chute which delivers them to a conveyor that carries them through a 1½-in. deep bath of water so that only the side rails are quenched. The rails, when cool, have a hardness of 400 Brinell



"Superfinished" Surfaces

Dave Wallace, president of the Chrysler Division of the Chrysler Corporation, has fathered a method of precision finishing which is being used in the manufacture of Chrysler cars

A. F. DENHAM

"SUPERFINISH" is an extremely fine surface finish produced upon flat, internal, external, round, concave, convex and other types of surface by a combination of short motions, light abrasive pressures, slow abrasive cutting speeds, hard abrasive stones and a lubricant of proper viscosity. After three years of experimentation and an expenditure of $300,000, the process has been developed to a point where it eliminates the scratches and surface defects created by previous mechanical operations, without creating scratches or defects in the Superfinish surface.

The process, according to Chrysler executives, is based on these factors:

1. The ductility of metals increases with temperature.

2. The higher the surface speed or cutting pressure, the higher the surface temperature. (Grinding produces less heat but higher surface temperatures than turning.)

3. Therefore the lower the surface speed the lower the ductility.

4. The lower the ductility, the shallower the scratch caused by a tool or abrasive.

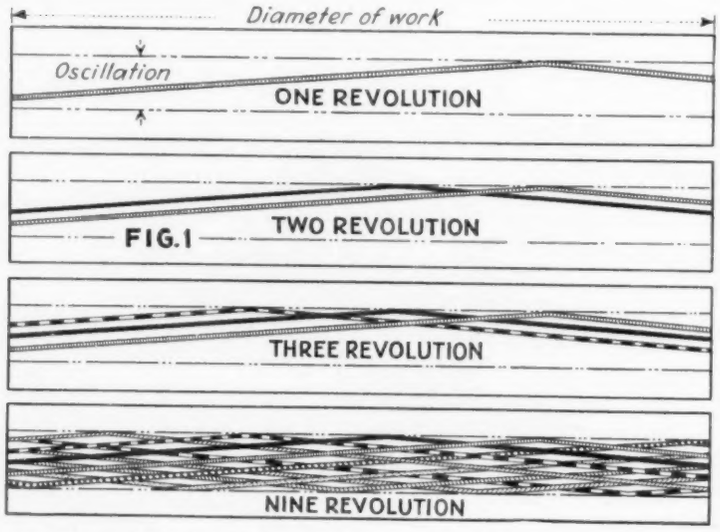
5. Discovery that in a surface finished by any conventional process—turning, grinding, lapping, etc. virtually all surface scratches are of the same depth. So that if all material between scratches is removed the surface will be completely smooth. (In grinding, scratches are all the same depth—though wider apart—whether a 500 or 300 grain wheel is used.

6. Designing machines with a combination of motions of the cutting material mostly at right angles to the work.

7. Last but not least, using the fact that a film of oil—if not punctured—will prevent metal to metal contact, to stop the cutting action after a smooth surface has been obtained.

The process at first glance appears to differ in no material detail from honing, similar stones—generally under spring pressure—being used. In operation, however, there are characteristic differences. The stones are applied against the work with extremely light pressures, the pressure preferably increasing as the end of the operation approaches. To the stones are imparted movements in several different directions, only one of which—at low velocity—is in the direction of tooling marks (turning or grinding on the work). While the oscillating movements imparted to the stones are quite rapid, actual surface speed is only around 2 to 15 ft. per min. because of the narrow range of stone oscillations. (See Fig. 1.)

The idea is to use just enough pressure on the stones so that the myriad of high spots on the work will puncture the film of oil. These high spots are then honed off by the stones. If pressure on the stones is increased, more high spots and bigger ones will break through the film to be Superfinished off, until finally a point is reached where the surface is smooth



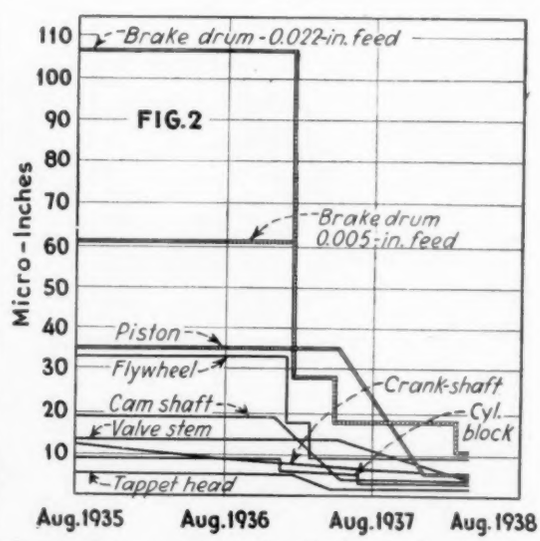


Fig. 1—Selection of the proper ratio of work r.p.m. to stone oscillation produces a pattern of paths by the lapping stone grit as shown in the diagram. Fig. 2—Yearly improvement in surface smoothness of various car parts is traced from inauguration of the lapping program in August, 1935

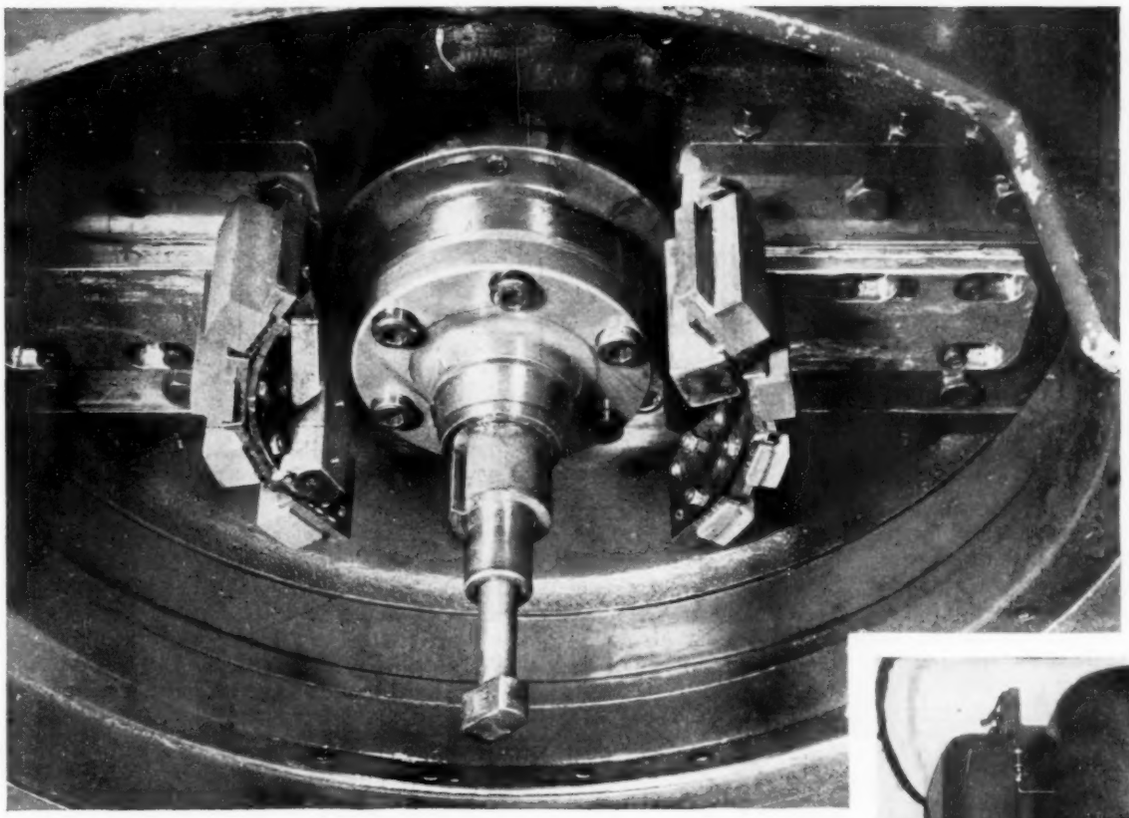


Fig. 3—In Superfinishing brake drums, stones are pressed against the inner surface in much the same way as the brake shoe would be in drawing the car

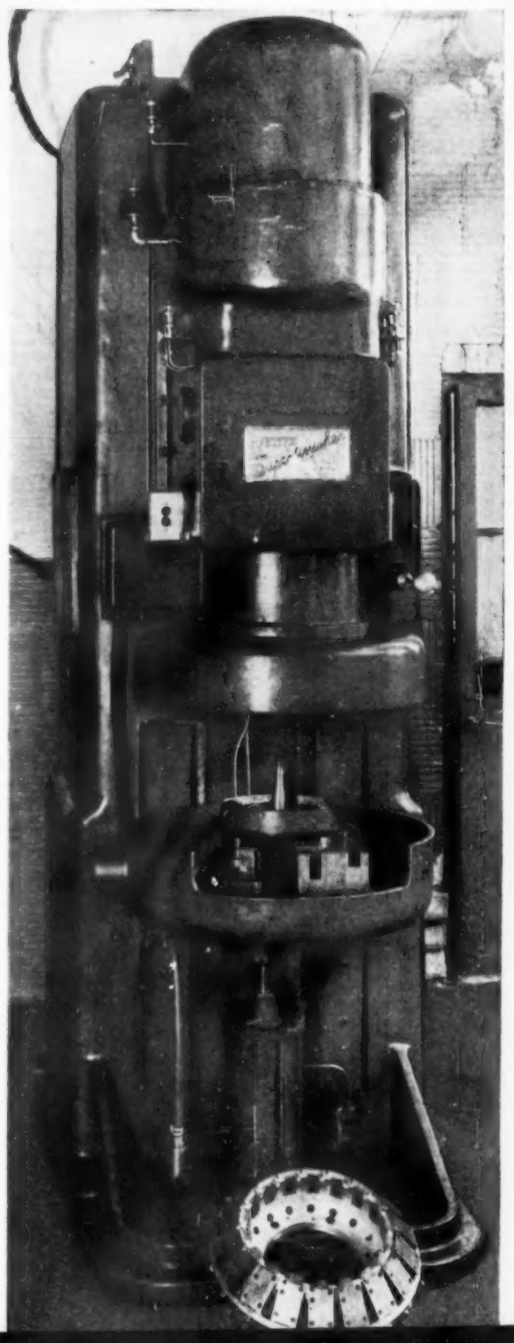


Fig. 4—For finishing brake shoes, the same type of machine is used as for brake drums except that in this case the work is held stationary

enough so that the film is no longer punctured and the stones could Superfinish away all day long without changing the character of the surface. The viscosity of the oil thus has an important bearing on when cutting action stops. When that point is reached, the surface is said to be Superfinished, and examination of it with the recently developed Profilometer, which measures surface irregularities to the millionth of an inch, shows it to be smoother, oftener, than a gage block.

It should be understood that the process is not intended to correct dimensional errors, but under certain conditions can be used as such. The stones will follow the surface contour and remove the high points.

While the above description of the process sounds quite lengthy and complicated, in actual commercial operation it is extremely rapid. In commercial usage, surfaces smooth to the millionth of an inch or less are unnecessary. Depending on the smoothness desired for the part, the actual cutting time may run anywhere from three to a maximum of 30 seconds. Most of the work is done in the first few seconds.

It makes little difference apparently just how the surface was finished prior to Superfinishing. Chrysler prefers a medium rough ground surface to a smooth preliminary grind.

Commercial stones are used except that care is taken to keep grain size uniform. For this purpose, abrasive manufacturers are using a "settling out" process in which the coarser grains sink more rapidly in a liquid and are thus separated out.

The process was first applied to the finishing of roller bearing races. Since then it has been applied in various degrees to crankshafts, valve tappets, piston pins, valve stems, brake drums and brake shoes, camshafts, main bearing seats, flywheels and pistons, from hard steel to aluminum.

That the process—while normally to be considered as an additional operation—does not necessarily add to the cost of production is illustrated by its application to Chrysler brake-drums. Here it was desired to obtain a smoother surface in order to achieve greater lining contact for better braking, as well as to reduce brake drum scoring.

What has been achieved in the way of smoothness in the past year is illustrated in Fig. 2. Prior to the winter of 1936-37, brake drums were finished by turning with a 0.005-in. feed, leaving tool marks to a depth of about 0.000062 in. (or 62 micro-inches). Today, brake drums are rough turned with a feed of 0.022 in., materially reducing cutting time, of course. If that feed had been used prior to Superfinishing, roughness

would have been to a scale of 107 micro-inches. The various stages of improvement of the Superfinishing process show that surface irregularities have now been reduced to about 10 micro-inches in regular production or 0.00001 in.

For Superfinishing brake drums, the machine shown in Fig. 3 is used. The drum is placed in the machine, and is raised against an arbor to which it is locked with a C-clamp. In operation, the drum rotates slowly (130 r.p.m.) while oscillating rapidly up and down (500 oscillations per min.) over a $\frac{1}{4}$-in. range. Meanwhile the stones are applied against the drum. These stones are mounted on a spring steel shoe pivoted like a brake shoe, with self-energizing action similar to a brake-shoe.

Outward pressure is applied against the pivots through a cam action in the machine, thus permitting a gradual increase in pressure during the operation. Between the cam and the pivot there are springs which even the pressure increase, the cam compressing the springs and the springs forcing the stones against the drum. The cycle is arranged so that the roughing stones at the left (180 grit) are applied first. Pressure is built up for two seconds. One second after final working pressure has been built up, the finishing stones (320 grit) are fed in with another two seconds to build up pressure. Another second and the pressure on the roughing stones is released. Four seconds more and the pressure on the finishing stones is released, the machine stops and the finished drum is removed. Total cutting time is thus only ten seconds.

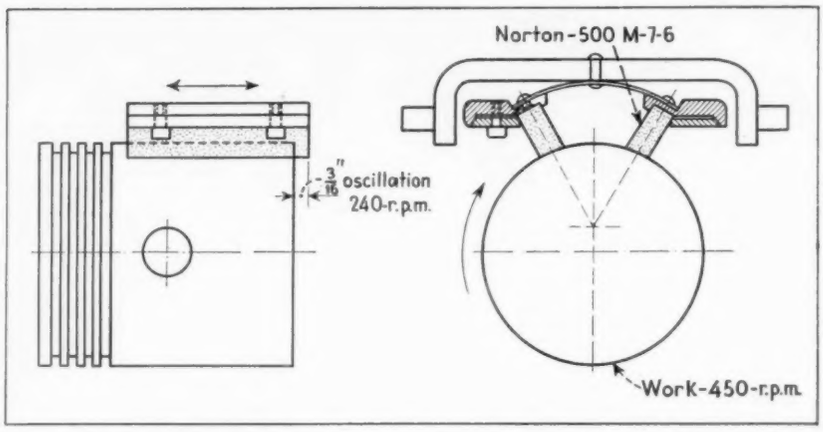


Fig. 6—A detail of the piston set-up gives the relative positions and motions of the work and stones; speeds depend on material hardness

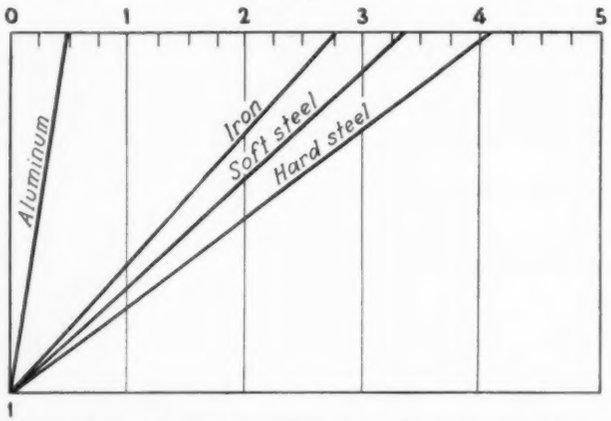


Fig. 7 — Preferred ratios of reciprocations per min. to work r.p.m. for a variety of materials is shown graphically. In general, as the material hardness increases reciprocation becomes greater in proportion to rotation

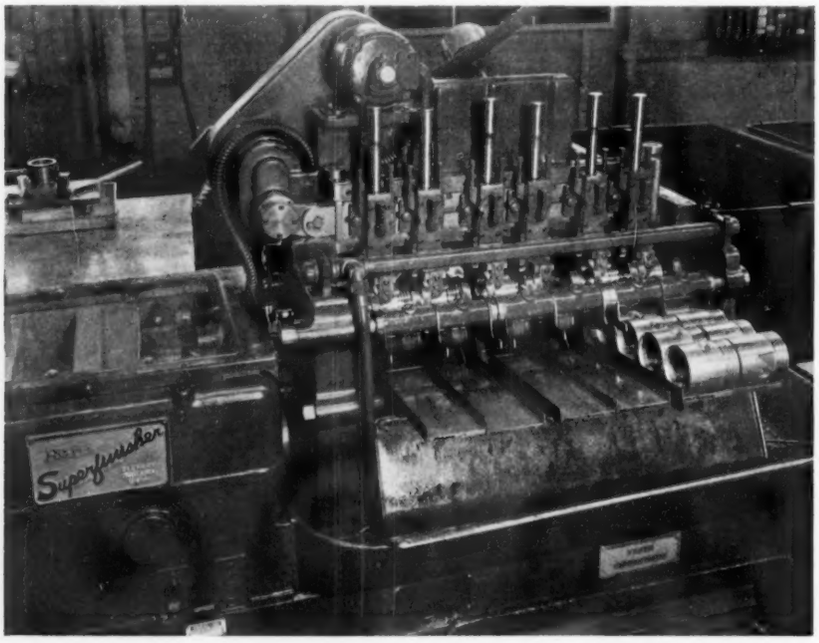


Fig. 5—In this automatic machine, pistons roll against composition cylinders which revolve them while the stones oscillate above them

The set-up for finishing brake shoes is quite similar to that for drums, Fig. 4. While this is perhaps not a true Superfinishing operation, since no lubricant is used to control depth of cut, the honing action nevertheless is based on the Superfinishing process. The major difference here is that the shoes are held stationary, while the stones oscillate up and down while revolving.

Fig. 5 shows the machine used for Superfinishing cam-ground aluminum alloy pistons. The machine is virtually completely automatic, the operator merely placing the pistons on the feed chutes. The stone set-up is shown in the detail drawing, Fig. 6. It will be noted that the stones are mounted on a light steel spring. The pressure of this spring is so low that both six- and eight-cylinder pistons (differing $\frac{1}{8}$-in. in diameter) can be finished interchangeably without changing the adjustment or set-up.

The pistons roll onto composition rolls which revolve them at approximately 450 r.p.m., while the stone carrying head oscillates fairly rapidly (240 oscillations per min.) over a $\frac{3}{16}$-in. range. It will be noted that the ratio of oscillations per min. to work r.p.m. is lower here than for the brake drums. Apparently in Superfinishing, the optimum ratio varies with the hardness of the material as shown in Fig. 7.

DAD SAYS

It Ain't Fair For Outsiders To Judge Our Jobs

LAST week while I was over in Plant C a crowd of visitors were going through and a couple of 'em stopped and chatted. As I was waiting for the foreman to figure out what sized gear to use I had quite a talk with these two men.

They seemed to be well educated, knew a lot of what was going on in the labor movement—as they called it—but I guess this was their first visit to a factory. One of 'em said some foundation company was paying him to study conditions in the factory.

Well, they certainly were all worked up about the way we were working there in the factory. They kept asking me how the men stood it. Didn't the monotony drive them crazy, and a lot of such questions.

Finally, I just told them to look around and watch the expressions on the men's faces. I pointed to one group who were laughing at a joke they had just pulled on a new man in the gang. I asked them if any of the men looked like they were going crazy.

Then one of them said that if he had to do the same job over and over each day—day after day—he sure would go crazy. I asked him if he ever went walking. He said he did a lot of it, especially when he wanted to get away and think.

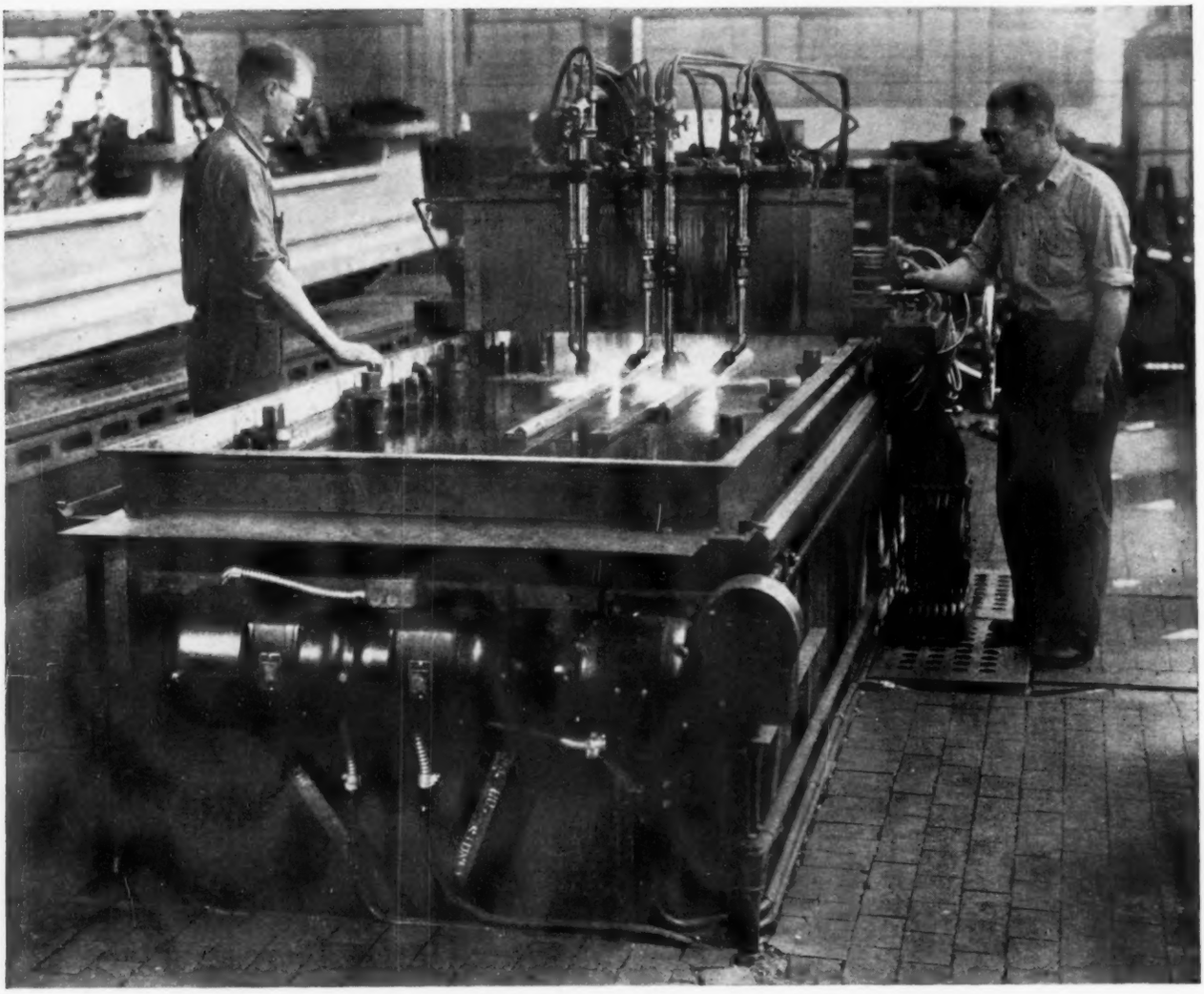
Well, then, I asked him why he didn't go crazy walking, because it was certainly monotonous—just taking one step after another—each just like the one before—no change at all.

Then I pointed out that the men on these kind of jobs think while they work, just like people think while they walk. Some men hate to change their kind of work because they would have to think about their new job instead of being able to plan and day-dream, which is mighty tempting to a lot of 'em.

Well, he sort of got my point and then the other visitor asked if the men didn't get awful tired. I told him he better go out where these men live and see them working in their gardens when they get through and then figure out whether they were killing themselves or not.

Of course the whole trouble with fellows like these is that they just walk through the plant and try to figure out how they would like our jobs. If they have never worked in a factory they probably wouldn't like it no more than I would like to be shut up in some stuffy office all day.

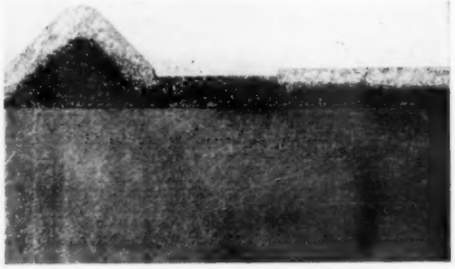
If such people want to help us—and that's what they said they were trying to do—there's lots of things that would make factory life better, but these two cookies weren't even close to what's wrong in the factory. Some outsider is always talking about the wrong things that are wrong.



Six flame hardening torches harden the way surfaces of a Monarch lathe bed in one pass. Depth of hardness is controlled by rate of traverse of the carriage

Hard Ways

Monarch eases the way to lathe-work accuracy by applying the oxyacetylene flame-hardening process to the production of its lathe beds



Grain structure of the hardened section is condensed with close-grained metal beneath

PRODUCTION of hard, accurate wearing surfaces on the ways of beds for machine tools long has been a problem of the first order. Beds of cast iron having chilled ways were tried many years ago. Later, others secured satisfactory results by adding steel and nickel to the castings. Another method, now fairly common practice in some lines of machine tools, is to mount hardened and ground steel strips on the ways.

Successful application of the flame-hardening process to the heat-treatment of gear teeth encouraged the Monarch Machine Tool Company to experiment with the application of the process to the treatment of the ways of lathe beds. Working for more than two years with a well-known supplier of oxyacetylene apparatus, Monarch engineers have succeeded in adapting this process to their requirements.

Most Monarch lathe beds now are cast of nickel-steel alloy and have an initial hardness of 225-240 Brinell. These castings are cleaned thoroughly with portable grinders, then given a preliminary coat of paint before any machining operations are performed. This coat of paint serves to protect the surfaces of the castings that are not machined throughout the shop operations and to help keep the shop clean. The first machining operation

on these bed castings is the planning of the way, end and bottom surfaces. Rough planed beds then are finish planed on the way surfaces, following which the beds are inspected carefully and those that are to be flame-hardened are delivered by crane to the specially-built flame hardening unit.

This machine, developed as the result of the investigations carried on by the engineering department, consists of a large tank and a traveling carriage. Lathe beds up to 14-ft. long can be immersed in water in the tank so that only the way surfaces are exposed. The traveling carriage moves the heating torches and quenching nozzles from one end of the tank to the other at a predetermined, variable rate. Throughout the flame-hardening operation, cold water is circulated continuously through this tank to maintain the bed at an even temperature and to minimize distortion. Six Airco-DB Style 4380 torches, each consisting of a combined burner tip and quenching nozzle approximately $\frac{3}{4}$ in. apart, are mounted vertically on the movable carriage of the machine.

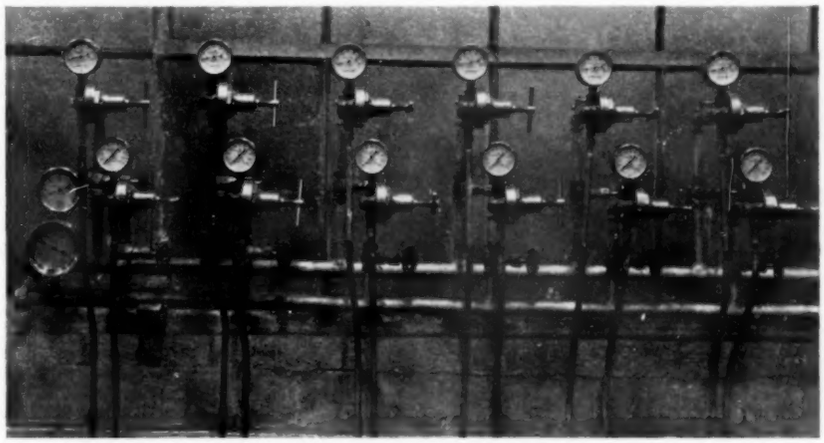
Separate tips are used for hardening the two flat ways and both sides of each of the two V-ways simultaneously. Each tip is made so that it just covers the surface on which it is used. A different set of tips is required for each size of lathe bed. All tips are maintained at a uniform distance from the surface being hardened. It has been found essential to maintain constantly uniform oxygen and acetylene pressures for the torches and constant water volume and pressure for the quenching jets.

Approximately 50 to 60 ft. away from the flame-hardening tank are the oxygen and acetylene cylinder racks. Cylinders are connected to manifolds which run to a pressure panel where indicator gages show the pressures in the manifolds and in each line supplying gas to the various burner tips. The oxygen and acetylene gases are mixed properly and passed underground through rubber hose to a special adjustable-drum mechanism, over which the hose passes up through the floor to the traveling carriage mechanism. After passing over the drum and across the top of the carriage, each hose is connected to the proper tip holder. Each of these tip holders is mounted in an adjustable bracket, all adjustments being made at the control end of the traveling carriage.

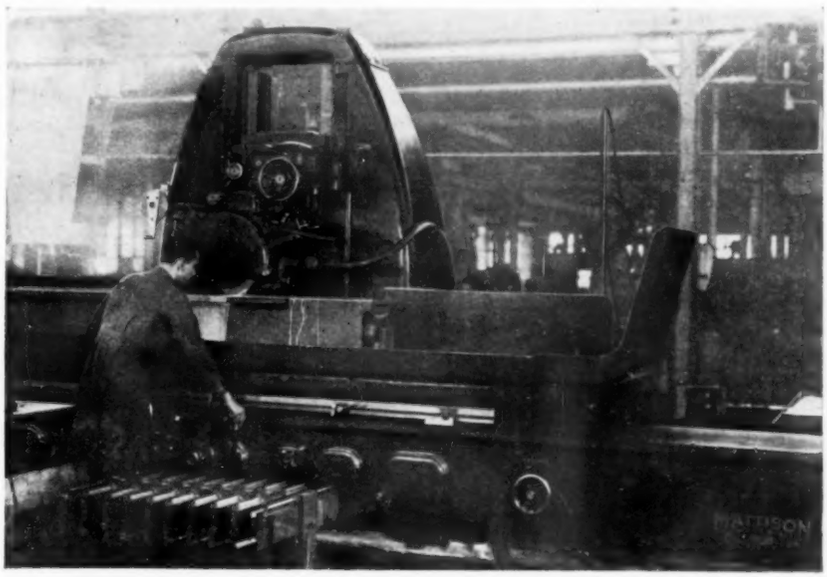
Rate of travel of the motor-driven cross rail along the bed depends upon the depth of hard surface desired and the thickness of the bed. Only one pass of the flame over the bed is necessary and rate of rail travel ordinarily is from 3 to 6 in. per min. This results in a $\frac{1}{8}$ to $\frac{1}{4}$ in. depth of hardness under usual conditions. Both the heat to be applied and the proper rate of travel are determined by treating test sections of each type of bed. Experimental hardening of these sections shows which burner tip is most applicable, how much cooling water must be used and the required speed of the burner carriage.

Distortion of the bed caused by this process ranges from 0.003 to a maximum of 0.015 or 0.020 in. over the length of the bed. Tests have shown that no appreciable strains in the bed casting result from this process, as the major portion of the casting is kept at normal temperature throughout the operation. Repeated tests prove that there is no tendency of hardened portions to crack or flake even under abuse. Typical hardened bed sections have been repeatedly flexed in a hydraulic press without injury to the hardened portion.

Following the heat-treating operation, these beds are delivered to a Mattison 24 x 30 x 144 in. horizontal spindle precision surface grinder where the way surfaces are ground to a tolerance of 0.0005 in. in the over-all length. The usual hardness obtained on a lathe bed by this process is between 70 and 80 Shore scleroscope. These readings always are higher after the ways have been ground than when taken immediately after hardening. Once the ways have been ground, the lathe beds are returned to the machining department.



Oxygen and acetylene cylinders are connected to manifolds which run to this pressure control station, from which rubber hose lines laid under the floor are connected to the flame-hardening machine



Flame-hardened ways of lathe beds are surface ground to a tolerance of 0.0005 in. in over-all length on this 24 x 30 x 144 in. grinder. Device mounted on the wheel slide permits truing both angles of the wheel for grinding V ways

PRESS WORKING OF METALS • NUMBER 1

Types of Presses in Common Use

The first article in this new series gives a guide to the more common types of presses, and their characteristics, and capacities

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INTELLIGENT planning and layout of press tools must rest upon a thorough knowledge of the characteristics and dimensions of the equipment available in the shop. Such details are also necessary in the selection of new equipment. Both the production man and the press tool designer must give consideration to what kind of press should be used on a given job, its speed, ram and bed dimensions, length of stroke, effectiveness of the crankshaft of the point in the stroke where maximum pressure is required by the operation, feeding arrangement or method of handling the piece into and out of the press, and the deflection that is permissible. Many of these factors can be known in advance by a convenient tabulation of dimensional data.

In the following ready-reference classification of the more common types of presses, the main subdivisions are gap-frame presses, straight-side frame presses, high-speed presses and drawing presses. Countless names are used to designate presses, but the ones chosen are generally accepted. High-speed presses and drawing presses are segregated from the other types, irrespective of frame construction, because they apply only to mass production or to a specified process. Information on the selection of presses with regard to capacity and peculiarities of the work will follow the material on the kinds of machines available.

One of the most important considerations in selection of a press is the deflection that may be expected. Press materials as well as die materials are elastic. Gap presses will deflect more disadvantageously than straight-side presses in the plane of the tools, because the throat tends to open as pressure is applied. On a great many jobs, deflection of gap presses is not important and is overshadowed by ease in handling the work into and out of the tools. Tie-rods may be affixed to the gap to control deflection but with some sacrifice in accessibility. But work requiring the highest grade of accuracy, or exceptionally heavy pressure, is usually done on straight-side presses.

Gap-Frame Presses

Foot Presses

Foot presses are the least powerful machines used for press work operations. They are adapted to light riveting, staking, piercing, embossing and assembling. Two general types of foot presses are available; plain toggle joint and toggle lever joint. In both types the ram is actuated by a foot lever and pendulum, and the toggle lever type has a weighted pendulum to increase the momentum.

Bench Presses

Next in size is the bench press. This machine is practically a miniature of larger presses and is adapted to almost every type of press operation. Machines of this class are used for manufacture of buttons, jewelry, watch parts, toys and novelties. Capacities range from 1,000 lb. to 12 tons. Roll feeds, ratchet dials, magazines, sliding-die feeds and automatic feeds may be applied to increase the output.

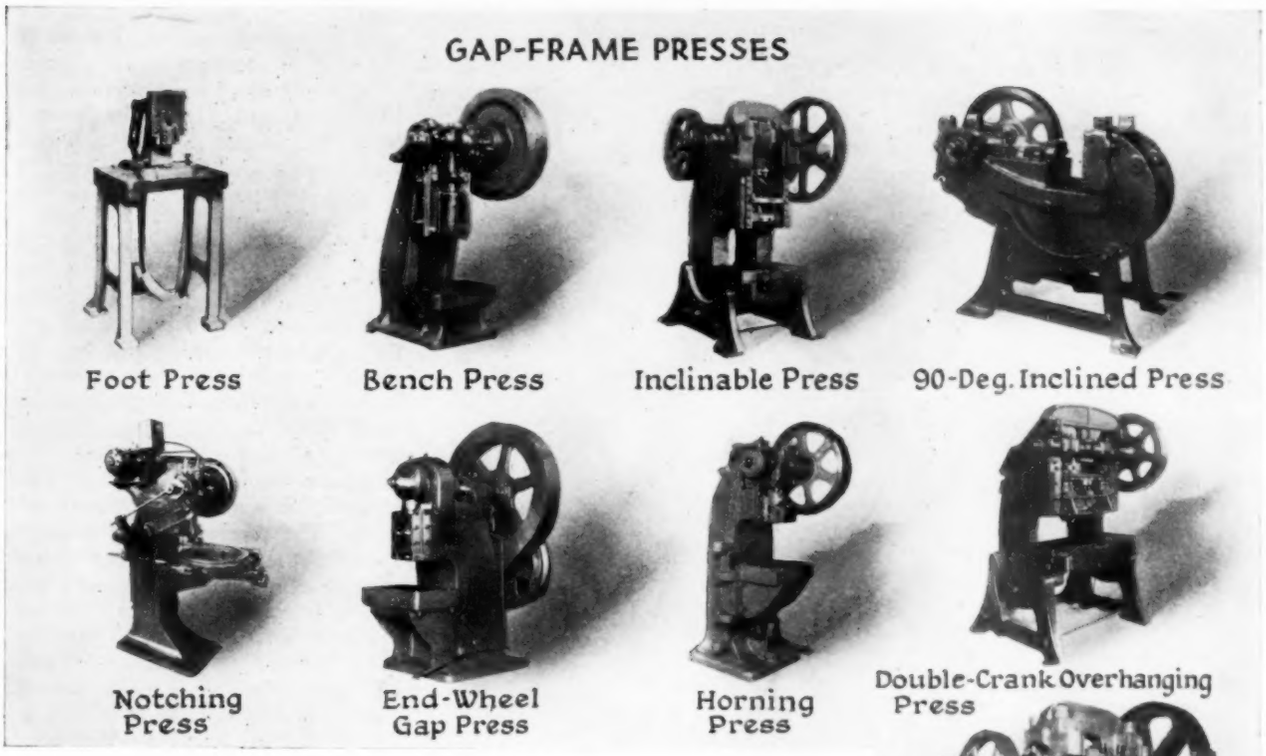
Inclinable Presses

Next in size above the bench press are flywheel inclinable presses and backgeared inclinable single-action presses. Machines of these classes cover the majority of requirements for single-action and combination die work on small articles and parts in comparatively light sheet metal. Their use includes blanking, forming, bending, light stamping and assembling. With the proper drawing attachments they are applicable to drawing work in cups and small shells.

The angle of inclination usually ranges from vertical to 45 deg. backwards, but one type is inclinable 90 deg. to attain greater use of gravity in ejecting the work. The horizontal position also aids the placing of long work in the dies for assembling operations. Feeding attachments of all kinds can be furnished. Capacities of inclinable pressess range from 4 to 90 tons at the bottom of the stroke.

Open-Back Gap Presses

This type of frame is similar to the inclinable press except that it does not



incline. The gap press is in great demand for use where strips or sheets of metal must be fed across the die, or where operations are to be performed on a product that is large or irregular. Gap presses can accommodate large area dies and are convenient for the arrangement of roll or dial feeds. Ram drives can be effected by either crank or eccentric motion. The latter is especially suited for punching, shearing, cutting out and forming blanks of heavy metal; and for operating trimming and forming dies used in the manufacture of agricultural implements, automobiles, cash registers, clocks and other articles made of bar and sheet steel. Capacities range from 1 to 225 tons.

End-Wheel Gap Presses

End-wheel gap presses have the flywheel at the rear and the crankshaft at right angles to the length of the bed. This construction is valuable for heavy work in long narrow strips, such as piercing, notching, cutting off, blanking, or forming. It is also used for a wide variety of other purposes, ranging from sub-press dies for watch parts, to wide deep-throated blanking dies; to wiring, seaming and similar work. Capacities range from bench sizes to 50 tons, when the machines are called power punching presses.

Deep-Gap Punch Presses

Deep-gap punch presses are designed with a deep clearance gap in the back frame, between the bed and ram slides, in order to handle wide sheets.

Horning Presses

Horning presses are built upright and cannot be inclined. A horn is bolted solidly to the frame for holding work such as a small steel drum while setting down the seam. Such presses are also available with swinging tables having a large opening for push-through work. The swinging table can also be raised or lowered to suit the die height. With the table in position, the press has many applications for such work as blanking, stamping, forming and wiring. Horn presses are often supplied with a heavy flywheel and a short stroke for heavy punching and riveting. Capacities range from 10 to 100 tons.

Double-Crank Overhanging Presses

Overhanging double-crank presses afford convenience in handling large, irregular sheets of metal, because the cut-back, or overhanging, frame gives a large, unobstructed die space. Presses of this class are well adapted to use of automatic and semi-automatic feeding attachments. Such presses can be used for blanking, cutting and perforating of comparatively thin stock. They are usually driven direct by flywheel, but larger machines are available in single, double or triple-geared design.

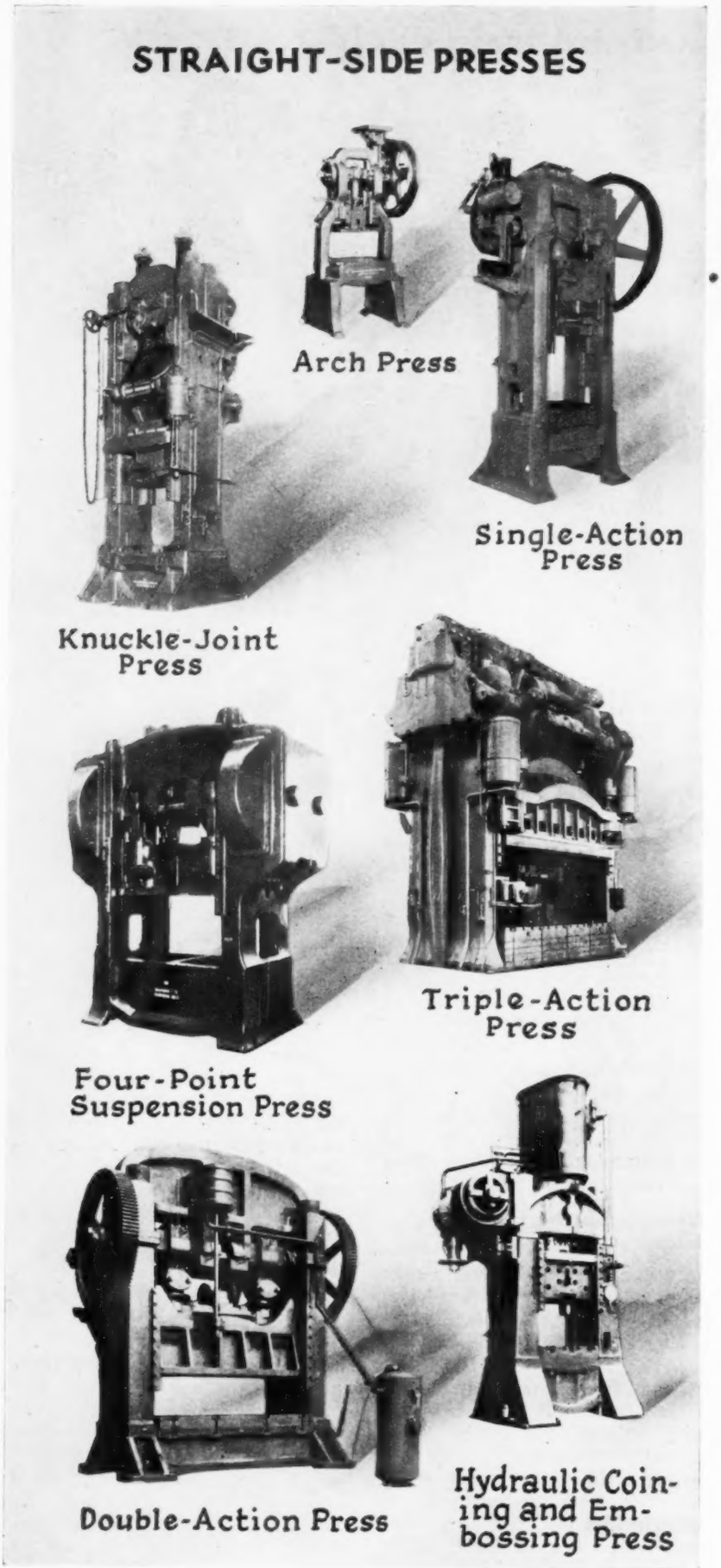
Notching Presses

Notching presses are short-stroke machines, usually 1-in. stroke, for cutting slots in the peripheries of motor laminations. The circular work fixture is driven by a rocker arm operated by the crankshaft. At each index, a locking pawl engages the fixture and holds the work stationary, while the punch and die are engaging to cut the slot. The feed usually is between 450 and 650 strokes per min.

Straight-Side Presses

Single and Double Action

Straight side presses are built either plain or geared and with single, double or triple connections between the ram and shaft. Straight-side construction consists of a base, two uprights and a crown. Usually the frame is tied together with four heavy steel tierods which take the pressure strains. The uprights themselves are heavy enough to withstand lateral



stresses which may occur when the slide is unevenly loaded. Presses of this type of construction are capable of operating dies for the heaviest kind of work. Usually the face of the ram of a straight-side press is provided with a dovetailed slot from front to back to facilitate using sub-press dies on accurate work.

One of the smaller straight-side presses is the arch type. Its utility lies in the large area of bed and slide in proportion to shaft size, and the advantages of the straight-side type of frame. The field for these presses is mainly light, large-area sheet metal work involving blanking, cutting, trimming, shaping, stamping, and large-area lettering. They can also be used for general combination die work. The piece is passed through from front to back, which is a slower method of feeding than from right to left. In some instances arch presses are built with exceedingly high die space and very long strokes for special uses. Most straight-side presses must be fed from front to back.

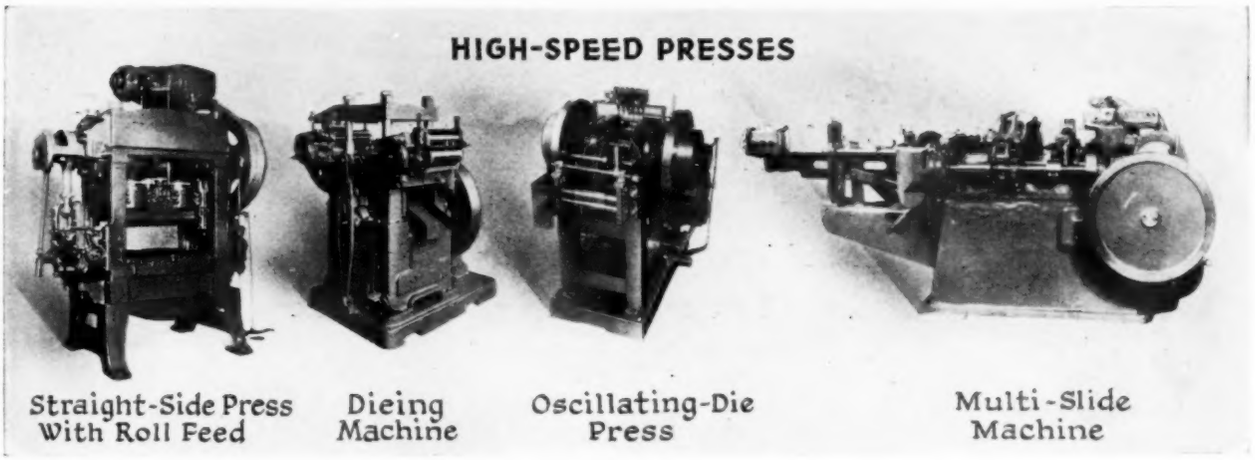
Double-crank straight-side presses are built in about 150 standard sizes. Regular uses for this line include blanking, punching, cutting, bending, shaping, forming and stamping or an unusually large number of articles. Often the slide is counterbalanced by means of an air cylinder and reservoir. Such presses are built as flywheel, single, double and triple geared. Where necessary, as for instance on a very wide or long stroke press, the twin-driven type is used, rather than that driven only from one end. Capacities up to 2,000 tons at the bottom of the stroke are available.

Four-Point Suspension

When huge pieces such as steel tops for automobiles are to be drawn, a four-point suspension press will be chosen. The feature of this design is the fact that an almost absolutely even pressure is exerted on the four corners of the slide, which is a valuable design feature when large unbalanced dies are being operated. Pneumatic cushions may be set directly into the bed of the press for such deep-drawing operations as fenders, thus giving a more compact set-up than when drawing cushions are used in combination with the conventional straight-side press. Capacities range from 100 to 1500 tons.

Knuckle-Joint Presses

Of recent years the knuckle-joint embossing press has come into more extended use. Originally employed for coining money, it is now applied



to cold squeezing, swaging, upsetting, embossing and extruding. Bosses on forgings can be sized as well by coining as by machining. In fact, bosses can be thrown up from flat sheet stock that would be impossible or very expensive by other methods. Pressures up to 100 tons per sq.in. can be applied to the material. The limitation of the knuckle-joint press is the short stroke, a knuckle-joint operating the slide. Modern knuckle-joint presses involve forced-feed lubrication systems at all main points where heavy pressures on the bearings or other moving parts occur. The slide of the machine is counterbalanced by spring-loaded rods. Capacities range from 25 to 2,500 tons.

Hydraulic presses have been recently adapted to coining and embossing, and they operate at speeds comparable to mechanical presses. A 1,000-ton model will have stroke in the order of 15 in. and weigh 80,000 lb. Small hydraulic presses for clamping and riveting from both sides of work have two rams, are built in sizes to 15 tons.

High-Speed Presses

Several types of high-speed presses are available for production speeds as high as 1,500 strokes per min. on a conservative basis. Their use is confined to sheet-metal plants where comparatively small articles are manufactured in large quantities, such as in the radio and electrical industries, and in plants producing small automobile stampings, chain links, heavy washers, and safety razor blades.

Straight-Side Press

In one make of high-speed press, the basic design involves a straight-side machine equipped with a high-speed roll feed at one end and a scrap cutter at the other end. Massive construction in the upright, crown and bed eliminates vibration in the machine itself and in the very accurate feeding mechanism. When built with short strokes, this press operates at 400 r.p.m. Automatic force-feed lubrication and individual drive through V-belts connected to a variable-speed motor are modern features. The variable speed motor permits the press to be run at the most suitable speed for the work. Capacities 10 to 400 tons.

Dieing Machine

Dieing machines are also built vertically, but the ram is operated by four vertical rods passing down through the bed where they are attached to a plate connected to the driving crank. Thus, a pulling stroke is applied to the die instead of the usual pushing stroke. The machine is adapted to progressive-die operation, but all varieties of press tool work can be fabricated. Machines in the smaller sizes run at 350 strokes per min.

Oscillating-Die Press

Another design of high-speed press feeds the strip steadily into an oscillating die. The bed, or plate upon which the die is mounted, is horizontally reciprocated by an eccentric driving crank. Lateral movement of the die is in the same plane and direction in which the strip is fed. The ram with punches attached is vertically operated parallel with the die, and being driven by the same crank that drives the plate, necessarily follows the die. Instead of following the conventional vertical stroke fixed at one place, the tool moves rapidly from right to left coincident with the feed of the material, while the cutting members are rapidly opening and closing on the strip. The strip, instead of pausing at blanking centers for operations, passes uninterruptedly through the die. The press operates at 1,000 strokes per min., and the fabricated parts are small and of light-gage materials.

Multi-Slide Machines

The horizontal multi-slide machine is largely a modification of the wire bending and forming machine, and is used for light operations on thin-gage materials. Accurate feeds to 0.0005 in., the performing of as many as eight operations and output up to 300 pieces per min. make the multi-slide machine attractive for light jobs that may involve blanking, forming, bending and assembly with other parts. In general, the machine notches the blank outline at one or more stations, the part remaining attached to the strip by a small neck. Bending, forming and assembly operations follow and are usually done before the piece is cut off. Strip passes through the machine with one edge up, and simple tools perform the various operations.

Drawing presses and the selection of presses will be taken up in Mr. Hinman's second installment, which will be published in an early number.

Static Grounding of Belts

As a result of recent investigations it has been found that static charges on the driving belts of many machines can be dissipated by treating the belts with an aqueous dispersion of cololidal graphite. Since this product is a good conductor of electricity, the film formed on the belts carries the static charge from the pulley to the frame. Present practice is to apply a suspension of colloidal graphite in water directly to the pre-cleaned belts by simply brushing on at the time of assembly.

How Much Elbow Room?

An estimated average is given for various classes of work based on an aircraft shop's experience

IN AN AIRCRAFT factory where space was fixed but work fluctuated from practically zero to capacity in short periods of time, the planning division adopted certain minimum areas of space per man upon which to base their peak employment. After considerable experimentation the figures given here were found to give maximum efficiency for the work to be done.

Once established, preparation of cost figures for bids on new work and determination of production possibilities for new work were simplified. These areas also provided a convenient basis for changes in shop arrangement and planning routines.

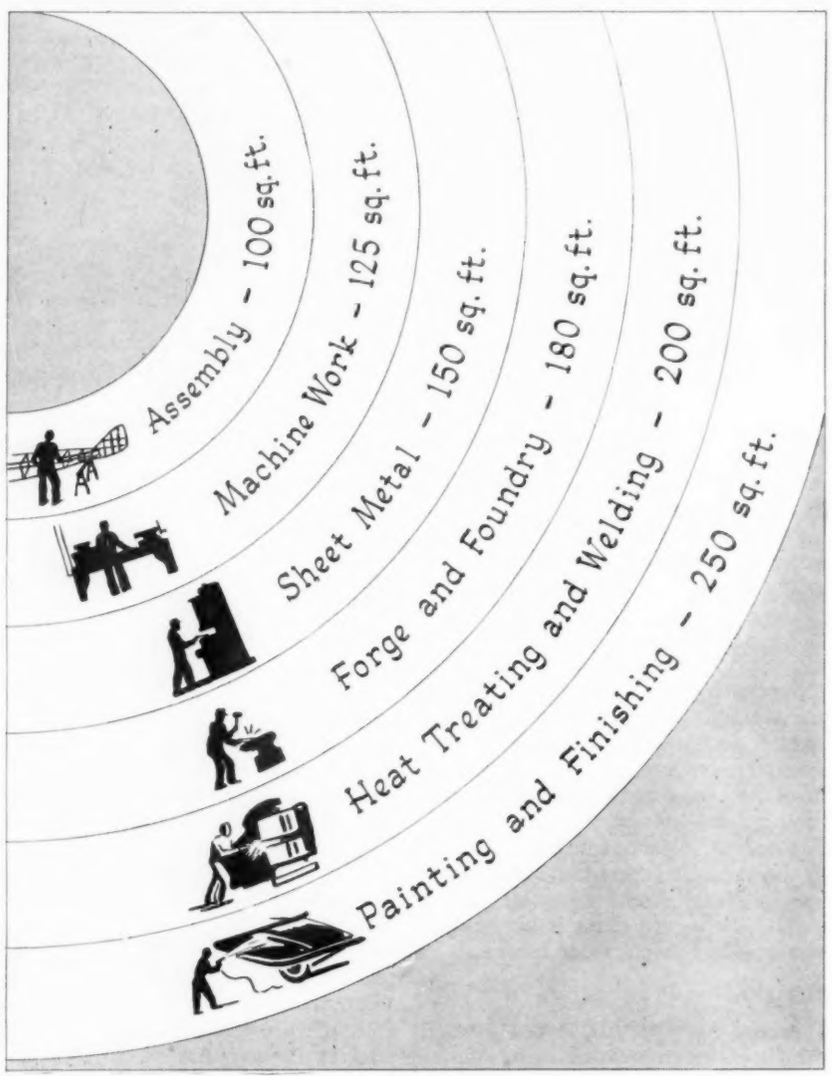
The allowance of 100 sq. ft. per man for assembly purposes shown here was for structural assembly other than assembly of airplanes. The allotment for assembly of a small plane was 275 sq. ft. per man and for a large plane 325 sq. ft. per man. For the fabric and panel covering shop, an allotment of 200 sq. ft. per man was made; 225 sq. ft. per man was allowed in the woodworking shop.

Requirements Vary

Areas per employee will vary for different manufacturing concerns for several reasons. First, they will be affected by the amount of work that a company has for each man. If the amount of work on hand involves the deposit of partially finished material in various portions of the shop while awaiting a man to work on it, space must be alloted accordingly.

The type of work to be done also influences the amount of space required. For example, if a man were to be working on sheet metal, it might be possible for him to bend, drill and then rebend or form to another shape all in one place in the plant. On the other hand, if a man is expected to do several diversified jobs, the required space is increased accordingly. Space per man goes up when more machines are required to do a job. Once having established a plant to do certain work any loss in the quantity of the work, but not its type, results in an increase of space per man. Any plant which is laid out in a building constructed for other purposes will find itself generally with more space than is economically necessary for each employee.

These figures, while admittedly general, should serve for preliminary calculations in the layout of new shops, or the layout of a shop in an old building. The areas required may then be increased or decreased, based on the judgment of the shop superintendent, as to the type of work to be done and the method by which the work is to be accomplished.


Assembly - 100 sq. ft.
Machine Work - 125 sq. ft.
Sheet Metal - 150 sq. ft.
Forge and Foundry - 180 sq. ft.
Heat Treating and Welding - 200 sq. ft.
Painting and Finishing - 250 sq. ft.

An approximate average of the floor space needed per employee for various operations serves as a guide in shop layout

Like a well-run job shop, RCA's model shop brings together all manufactured parts, purchased parts and materials at the assembler's bench on schedule

Model Shop Links Design and Production

New ideas are quickly converted into models that are built so as to smooth out production difficulties

F. L. CREAGER
Superintendent, Model Shop, Engineering Division
RCA Manufacturing Company, Inc.

MODEL building is a broad term. It can mean anything from "inventing" to running a large-scale department employing scores of men and utilizing modern shop facilities. The latter is a complex undertaking, and its proper functioning is vital to the manufacturing concern of which it is a part.

The function of the RCA model shop is to take drawings, sketches or oral instructions from engineers, physicists and other research men, and to convert their ideas into models that will be as nearly like the finally manufactured form as it is possible to anticipate.

Advantages accruing from this setup are:

1. Time is saved. A highly competitive business like radio requires that new ideas be rushed into manufacture or to oblivion. Delay must be minimized in building receivers; it must be further minimized by engineering the apparatus for manufacture, thereby saving in redesigning.

2. A properly coordinated apparatus is more understandable to all concerned than a crude model.

3. Fewer bugs will be discovered after the design goes to the shop.

Competent and rapid service requires adequate technical ability, management, men, equipment and a large supply of almost all conceivable materials.

An idea of how quickly the department can swing into action is shown

by the building of a conventional chassis base in four hours. This is the part upon which the condensers, transformers and tubes are mounted on top while the wiring is underneath. Operations on the chassis base include piercing an average of one hundred holes, forming, welding and plating.

The work involved in the model shop includes:

1. Checking the drawings by the superintendent or his assistant to suggest any changes which will facilitate production in quantities and at the same time not affect the function of the device.
2. A breakdown of the job by expediters who route work through the model shop, accumulate stock and purchased parts.
3. Production of the chassis base and any non-standard components.
4. Purchase of required commercial items.
5. Winding coils and braiding cables.
6. Assembly of the receiver.
7. Wiring of the receiver.
8. Sending the completed job back to the engineer concerned for testing. All prints are returned with the job because ideas become obsolete quickly or because the job goes to production.

It is especially important that the model shop management have authority to suggest changes in materials or specified methods of fabrication, so long as the functional design of the apparatus is not changed in order that the completed model will incorporate current production practices. Experimental designs are worked out by technical men of different backgrounds and training. Someone with long familiarity with shop practice and with RCA methods must correlate the design with manufacture, anticipate trouble, foresee economies. Necessarily, the shop's management must keep in close touch with the factory, with new materials, new processes and with developments in communications apparatus.

Besides functioning in a consulting capacity, the shop must provide the rapid service mentioned. Its creed might be summarized as: "Find out the best way to do a job. Then standardize and forget about the detail. Don't work out the same procedure twice."

In line with the above, wherever possible, mounting dimensions of component parts have been standardized permitting the manufacture of tools with the assurance that reasonable runs may be made before obsolescence occurs.

Standard instructions for welding, plating and heat-treatment are posted at the operator's booth or station—also for the purpose of saving time and preventing mistakes. These instructions are prepared from data obtained from materials suppliers, and the authority's name is put on the sheet. Thus, any difficulties can be referred to him quickly if necessary.

In the case of a salt bath the table shows the number of minutes to obtain a certain depth of case with the proprietary material used. Heat-treating instructions for unusual materials such as beryllium copper list the temperature and time for different thicknesses and tempers. Welding data show the size of stock and corresponding current tap. Thus, operators need not bother the foreman when a little different job comes in. They cannot misunderstand verbal instructions, and they always work according to the instructions of an authority on the subject.

Speed Depends on Stock

Rapid functioning of the model shop would be impossible without an adequate supply of materials and standard manufactured parts. About 9,000 items are stocked and a perpetual inventory is kept. Bars and tubes are racked in 3 ft. lengths, sufficiently long for the small runs in the shop. These raw materials are color coded to prevent mistakes. Usable scrap is kept in the storeroom and is identified by material and temper to prevent confusion or wrongful substitution. This is necessary because electrical characteristics of different temper hardnesses of the same material are often considerable.

Resinous products are identified by purchase specification numbers and checked against specification sheets before being issued. Manufactured parts such as resistors, tubes, condensers and hundreds of other items are stored in bins or drawers.

Although a perpetual inventory is kept for all materials and most of them are bought according to usage, some unusual materials are bought in quantities when delivery conditions are particularly unfavorable. Thus, when the expediters are breaking down a job they are not confronted with delays that will prevent the model shop from getting a job out on time.

Equipment throughout the shop is of modern design and is arranged to facilitate production. The men are high grade machinists who are capable of doing almost any operation, but there are certain specialists for coil winding, welding and heat-treating. Each bench has adequate working space and is well lighted. Illumination is provided by overhead daylight fixtures with an output of twenty lumens per square foot on the working plane. Ample glareless light is essential in doing many of the close jobs of fitting or making pieces by hand and it has been a big factor in achieving satisfactory working conditions.

About 9,000 items are stocked and a perpetual inventory is kept so as to maintain an adequate supply of materials and standard manufactured parts

ROUND TABLE

Gratitude

"What's become of Frank Green, Al? Haven't seen him around here for a couple of weeks. I'd think you would hang on to him; he was the most likely looking apprentice you've had in a long time."

"His dad is an old timer at the trade, Ed, and he advised Frank to leave here as soon as he had finished his time; told him that the only way he could hope to know anything about toolmaking was to find out how the other shops do the same kind of work. I did all I could to hold him, but he was dead set on going."

"That's hardly fair to you, Al. When we start a boy out as an apprentice it is with the understanding that he will stay with us for at least three years after his course is finished. It costs a lot to train an apprentice and it is only fair that he try to repay a part of what has been spent on his education."

"That isn't what you and I did when we got our papers, Ed. Both of us saw the inside of a lot of shops before we wound up as foremen. I can't see why it isn't a good thing for a youngster to find out what is done on the other side of the fence."

"Times have changed since we

learned our trade, Al. Then practically every shop, no matter how small, was training one or more boys. Today there are darned few shops that have training programs. Why should we train men for plants that aren't carrying their share of the load?"

"I'd want my boy to do just what we did, Ed. Wouldn't you?"

"Can't say that I would, Al."

What does an apprentice owe the company that provides facilities for learning a trade?

DISCUSSION

Castings in the Yard

"Where workmen are paid by means of some fair incentive system," writes F. L. Ingleright, superintendent of the Bradford Motor Works, "the storing of additional raw material out in the yard will not slow down the work being done, even through the individual may be on his last job. On the other hand, where a straight hourly rate pay system is used the job at hand is bound to suffer if the men believe that the operation they are performing may be the last —no matter where the castings are stored." Mr. Ingleright also points out that storing materials away from the machines is just good housekeeping, and will have no detrimental effect so long as the men understand that the work is to be done. The picture can change rapidly if the men are led to believe that work orders are to be delayed, no matter how much raw material is available or where it is stored.

Preventive Maintenance

O. W. Winter, factory manager of Columbus-McKinnon Chain Corporation and Chisholm-Moore Hoist Corporation points out that: "It is a sound policy to pay a doctor to keep you well, rather than take medicine after you are sick. The bill usually is considerably less. In the same way, preventive maintenance carried out in a systematic manner actually is a saving of expense as it eliminates more expensive repairs in the future as well as the patchwork jobs done in a hurry to keep a machine operating when production requirements are heavy." He also says that "overhauling equipment during the slack seasons does not constitute preventive maintenance in the strictest sense, as it should be carried on as a continuous program."

Spite Fence

James K. Matter, discussing Al's attempt to purchase a jig from Sam Wilcox, says in part that: "Sam probably put many hours of concentrated thinking into the design of this particular jig—work that does not show up in the finished tool. He would be a fool to give it to a competitor at the competitor's valuation. I think the Golden Rule is being stretched too far this time. I don't make the rules—I just try to play them and the boys don't play the way Al wants." Mr. Matter further brings out the thought that it isn't a question of personal feelings and that Sam no doubt expects to get the job again, hence has good reasons for wanting to keep the jig. He developed the business and made the tool, then had the misfortune to lose out on one contract—which doesn't mean that he can't get it again.

On the other hand, W. E. Warner of London, England, suggests that an arrangement by which small companies would sell or lend jigs and other tools to competitors would lead to economies and make for better cooperation. He believes that personal feelings should be kept under control as much as possible where purely business matters are concerned.

Shock Absorber

C. D. Mackinnon of Lanarkshire, Scotland, has yet to meet the shop manager who "does not number among his men one or two oldtimers that he regards as indispensible despite the fact that they are older than the average. These men usually are dependable and it is not always the case that age and mature experience go hand-in-hand with mental inertia." He believes that a leavening of age and experience among the workers is in the interest of the company and the stockholders.

Signal Warns Craneman

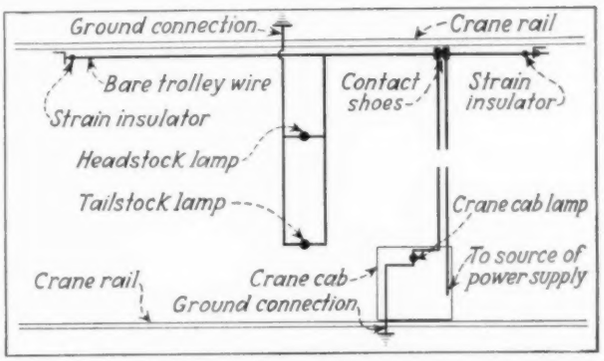
Flashing red lights indicate when overhead crane is within danger zone on either side of large mill

BEN C. BROSHEER
Assistant Editor, American Machinist

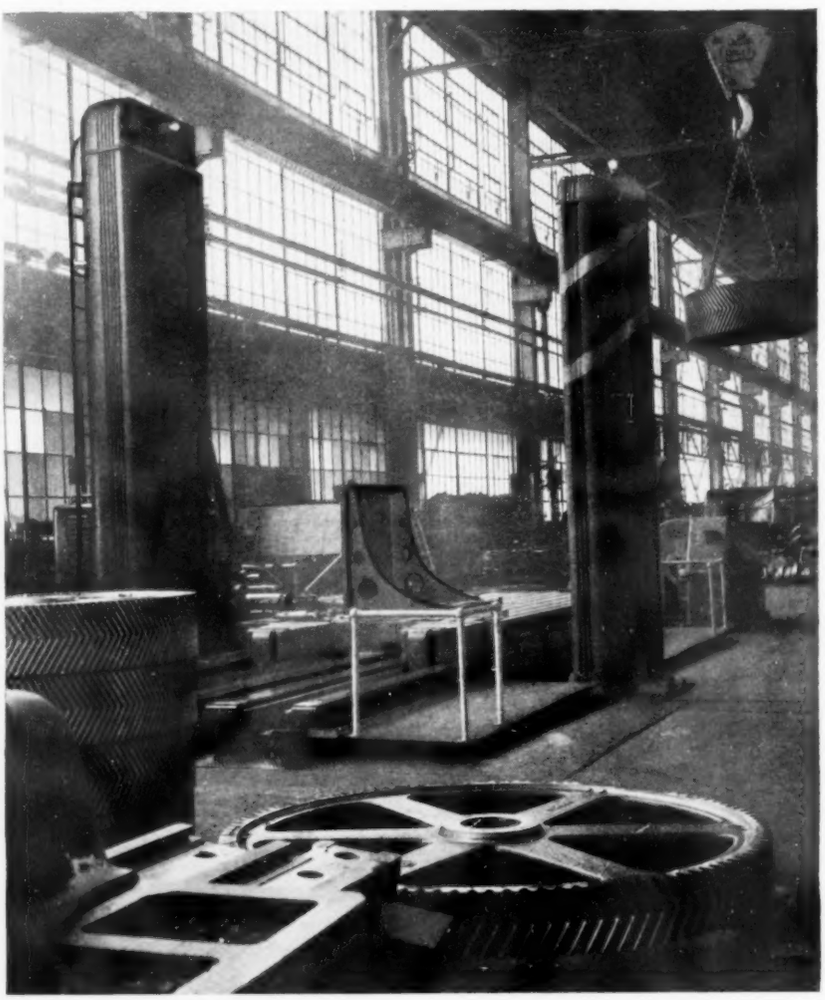
A LARGE, floor-type boring, drilling and milling machine in the main aisle of the Buffalo plant of the Farrel-Birmingham Company was damaged some time ago when a craneman misjudged his load clearance and struck the tailstock bearing column with a heavy gear blank, knocking the column to the floor. To prevent a recurrence of such an accident, both of the columns of this machine have been painted with bright yellow lines and a system of red warning lights has been installed.

Since the tailstock column of the machine extends into the center of the aisle, it is necessary that the craneman be warned when approaching the machine from either direction. For this reason, the protective signal circuit operates whenever an overhead traveling crane is within 25 ft. of the machine. As is indicated in the accompanying diagram, the signal lamps on the two machine columns are connected in parallel between a bare trolley wire, strung between two strain insulators parallel to one of the crane runway rails, and a ground connection. The crane cab lamp is connected in series between a contact shoe and ground.

There are two contact shoes, insulated from each other, suspended from each overhead crane in position to contact the bare trolley wire when the crane is within the danger zone. Power supply is connected to the second contact shoe; thus the circuit is energized only when the contact shoes are riding on the trolley wire. The effectiveness of the system is evidenced by the fact that no accident has occurred since its installation.



This simple circuit serves to light warning lamps in the crane cab and on top of each machine column when a crane is within 25 ft. on either side of a large mill in Farrel-Birmingham's Buffalo plant



Flashing red lights, together with a series of bright yellow stripes painted on the machine columns, serve to protect this large floor-type miller from damage by heavy parts being carried by any one of several overhead cranes

AMERICAN MACHINIST *Reference Book Sheet*

Time-Data Sheet No. 6

Thread Grinding on Hardened, Undercut Studs—III

Diameter Inches	Pitch	Thread Length	Rough Grind Minutes	Work Speed R.P.M.	Finish Grind Minutes	Work Speed R.P.M
7/16	12	1 1/4	1.13	24	0.81	40
7/16	14	1 1/4	1.13	30	0.89	40
7/16	16	1 1/4	1.18	32	0.95	41
7/16	20	1 1/4	1.24	37	1.03	45
1/2	11	3/8	0.59	19	0.63	35
1/2	13	3/8	0.57	24	0.63	34
1/2	16	3/8	0.60	27	0.63	35
1/2	20	3/8	0.62	32	0.54	39
1/2	11	7/16	0.64	19	0.63	35
1/2	13	7/16	0.61	24	0.63	34
1/2	16	7/16	0.66	27	0.63	35
1/2	20	7/16	0.67	32	0.60	39
1/2	11	1/2	0.70	19	0.63	35
1/2	13	1/2	0.67	24	0.63	34
1/2	16	1/2	0.71	27	0.64	35
1/2	20	1/2	0.73	32	0.63	39
1/2	11	9/16	0.73	19	0.63	35
1/2	13	9/16	0.71	24	0.64	34
1/2	16	9/16	0.75	27	0.64	35
1/2	20	9/16	0.67	32	0.67	39
1/2	11	5/8	0.79	19	0.64	35
1/2	13	5/8	0.76	24	0.64	34
1/2	16	5/8	0.81	27	0.67	35
1/2	20	5/8	0.84	32	0.71	39
1/2	11	11/16	0.84	19	0.64	35
1/2	13	11/16	0.81	24	0.64	34
1/2	16	11/16	0.86	27	0.71	35
1/2	20	11/16	0.89	32	0.76	39
1/2	11	3/4	0.90	19	0.64	35
1/2	13	3/4	0.84	24	0.68	34
1/2	16	3/4	0.92	27	0.75	35
1/2	20	3/4	0.95	32	0.80	39
1/2	11	13/16	0.94	19	0.64	35
1/2	13	13/16	0.90	24	0.71	34
1/2	16	13/16	0.97	27	0.78	35
1/2	20	13/16	1.01	32	0.85	39
1/2	11	7/8	1.00	19	0.65	35
1/2	13	7/8	0.94	24	0.73	34
1/2	16	7/8	1.02	27	0.83	35
1/2	20	7/8	1.06	32	0.89	39
1/2	11	15/16	1.05	19	0.68	35
1/2	13	15/16	0.98	24	0.78	34
1/2	16	15/16	1.08	27	0.87	35
1/2	20	15/16	1.12	32	0.93	39
1/2	11	1	1.11	19	0.71	35
1/2	13	1	1.04	24	0.81	34
1/2	16	1	1.13	27	0.91	35
1/2	20	1	1.17	32	0.98	39
1/2	11	1 1/16	1.15	19	0.73	35
1/2	13	1 1/16	1.09	24	0.84	34
1/2	16	1 1/16	1.18	27	0.95	35
1/2	20	1 1/16	1.23	32	1.02	39
1/2	11	1 1/8	1.20	19	0.76	35
1/2	13	1 1/8	1.14	24	0.87	34
1/2	16	1 1/8	1.24	27	0.98	35
1/2	20	1 1/8	1.29	32	1.06	39
1/2	11	1 3/16	1.26	19	0.79	35
1/2	13	1 3/16	1.19	24	0.92	34
1/2	16	1 3/16	1.29	27	1.02	35
1/2	20	1 3/16	1.34	32	1.10	39
1/2	11	1 1/4	1.31	19	0.82	35
1/2	13	1 1/4	1.23	24	0.94	34
1/2	16	1 1/4	1.34	27	1.06	35
1/2	20	1 1/4	1.40	32	1.15	39

ANALYSIS:

Time allowances shown include handling time, machine time, and relaxation and wheel dressing allowances. Handling time includes placing and removing the driving dog (done while grinding the preceding piece), placing the piece between machine centers, starting and stopping the machine, removing the piece from the centers, inspecting the ground threads, and placing the pieces aside in special trays which keep the studs separated to protect the threads. Work is delivered to the thread grinder in pans from a preceding centerless grinding operation.

These standards apply only when a Carborundum Type K4Y-1503-4 resinoid-bonded wheel is used at approximately 11,000 surface ft. per min. peripheral speed. Wheel diameter when purchased is 18 in. and it is used until dressed down to 14-in. diameter. It then is broken up for use as an abrasive in tumbling barrels.

Speed of work rotation has been determined by experiment for each diameter and pitch combination to give the most economical production rate without danger of burning the work. During the grinding operation the work is flooded with coolant.

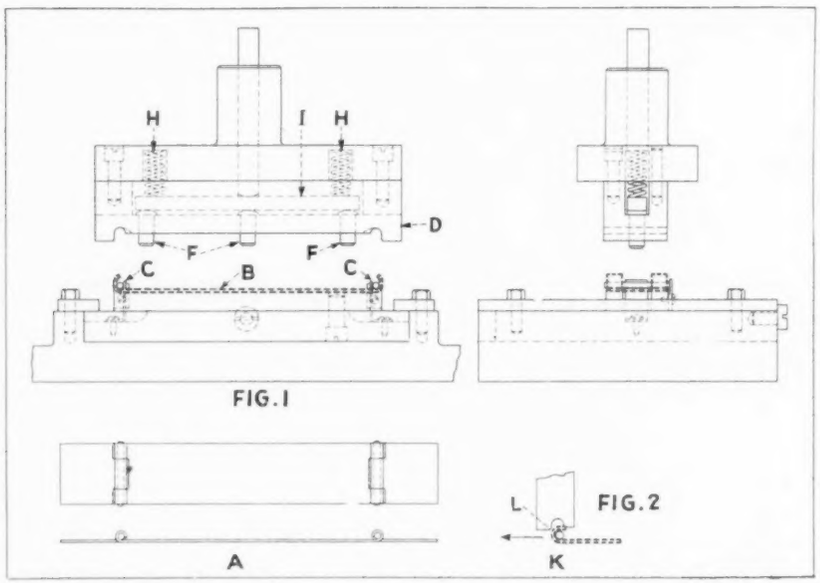
Revolutions per minute of the grinding wheel are to be increased as the wheel diameter is decreased by dressing in order to maintain the 11,000 surface ft. per min. of the grinding wheel determined by experiment to be best for the rough and finished grinding of threads of these heat-treated, chrome-nickel steel undercut studs. Wheel dressing allowances are calculated as a percentage of the actual grinding time in determining these standards. Where grinding time is less than handling time, the handling time has been used to determine the allowed standard time. Driving dogs are placed and tightened during the rough grinding operation and released and removed during the finished grinding cycle.

Studs are hardened in the blank form, then ground on the outside diameters concentric with the centers on which the studs are placed for grinding the threads. Threads are ground from the solid in the rough grinding operation, then finish ground in the same machine.

INSPECTION:

Finish ground threads are held to a tolerance of 0.00002 in. and are magnified 70 times in a comparator for inspection. Here the projected image is compared with a carefully drawn enlarged outline of the thread. The U form at the base of the thread is held carefully, as a sharp angle at this point might provide the starting point for a crack. Thread side angles and pitch are held to the 0.00002 in. tolerance for all thread sizes listed in the above tabulation. Finish ground and studs are placed vertically in tray racks having separators to prevent damage to the threads.

IDEAS FROM PRACTICAL MEN



After closing the eyes of the center piece around the hinge pin, as at Fig. 1, an end piece is assembled with a small-radius punch, Fig. 2, that gives all three eyes a final squeeze

Press Tools for Battery Carriers

GEORGE WILSON

The press tools illustrated are for assembling replacement battery carriers for Ford cars. The carriers are in three parts hinged together in two places, an assembled unit being shown at *A*. The center piece is given initial bends at both ends in the shape of hooks, one end of each piece being bent likewise.

A center piece is placed in the tools, Fig. 1, on the hardened block *B*, at the ends of which have the same radius as the hooked ends. The hinge pins are laid in the hooked ends of the work where they are held by the light springs *C*, and endwise against stops. To facilitate loading and afford safety to the operator, the die is mounted on a slide and is drawn toward him. After loading has been completed, the die is pushed back against a stop, locating the work under the tools in the ram.

The upper member of the tools is provided with the hardened punch *D* which has recesses of the same radius as those in the die and is recessed for clearance of the light springs *C*. Plungers *F*, springs *H* and bar *I* prevent the work from buckling in the center and also act as a knockout.

As the ram descends, the hooked ends of the work are closed tightly around the hinge pins, which have acted as mandrels. The center piece is now ready to receive the end pieces, one unit of which may be seen at *K*, in Fig. 2.

The end pieces are hooked by hand around the hinge pins assembled in the center piece and are located under the punch, Fig. 2, by stops, the flat part resting on pads. When the ram descends, the upright ends of the hooks are bent down and closed around the hinge pins. As the eyes are formed the end pieces slide in the direction of the arrow until stopped by the longer side of the punch at *L*.

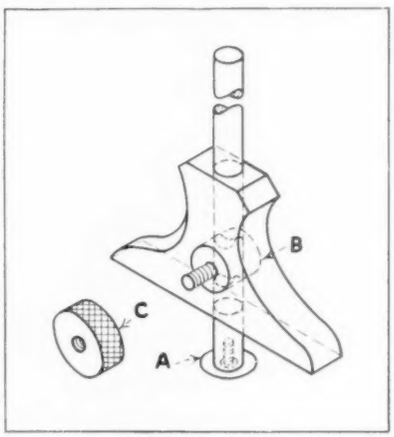
Closing the hooks of the end pieces around the hinge pins is rather an unorthodox operation. To assemble the parts the hooks must have a considerable greater radius than that of the punch that does the final closing. It is one of those jobs that shouldn't work, but does.

Combined Depth and Marking Gage

ALFRED KOLKIN

The tool illustrated is a combined depth and marking gage, the marking part of which is used in the same way as a carpenter or a patternmaker uses a scratch gage, only it is for use on metal instead of wood.

The marker *A* is a piece of thin, round tool steel and is held on the lower end of the measuring rod by a screw. It is hardened, tempered and beveled to a sharp edge by grinding and will make a sharp clean line. It is set to the desired distance from the bottom of the gage by scale measurement, but the measuring rod can be graduated for direct reading.



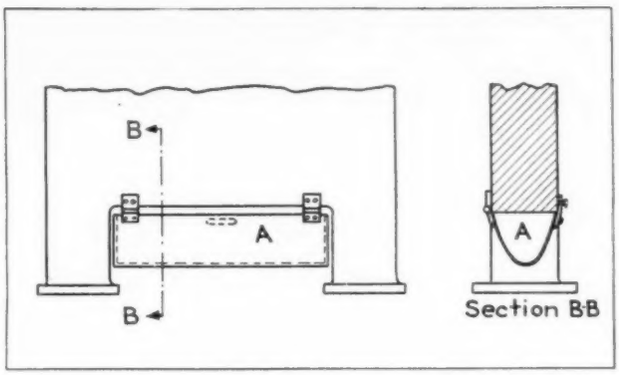
The marker is a piece of thin, round tool steel held on the lower end of the measuring rod. It is hardened, tempered and ground to a sharp edge

The measuring rod passes through the loose plug *B* by which it can be clamped in any desired position by tightening the knurled nut *C* on its threaded end.

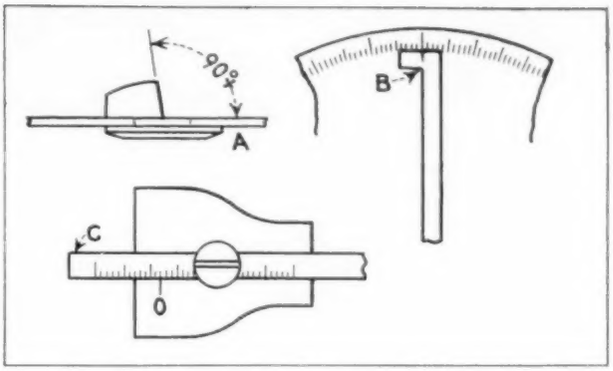
Chip Pan for the Lathe

F. J. WILHELM

Formed to suit the distance between the legs of the lathe and the height of the bottom of the lathe bed above the floor, the chip pan *A* is



The chip pan is attached to the front of the lathe bed by hinges and is held up at the back by latches



A zero line where the tab is joined to the protractor blade affords greater convenience in setting

attached to the front of the lathe bed by hinges and is held up by swiveling latches at the rear.

The pan is made of 10-gage sheet iron and the ends are welded to the body. Handles at the back are provided for holding the pan while it is being raised or lowered. When the pan is unlatched and lowered to the floor the chips do not fall out but can be shoveled out into a wheelbarrow or other movable receptacle. The pan is neat and compact and the floor beneath it can be swept without interference.

Quick-Acting Drill Jig

J. R. WHITTLES

A large number of flanged and threaded pieces, as at *A*, were to be drilled at a predetermined angle, and we made the jig illustrated.

The body is bored at the required angle and is counter-bored to receive the steel bushing *B* which is held in place by a pilot screw. The work is located endwise by a recess in the flange contacting the projecting end of the bushing, which acts as a stop, and is prevented from turning by the end of the spring-actuated plunger *C* engaging a hole drilled in the periphery of the flange, the plunger being operated by the lever *D*. Lever *D* is bifurcated and straddles the boss *F* in which the plunger operates, and is pivoted at *H*. The hardened bushing *I* guides the drill.

By pressing down on lever *D* the pin is withdrawn from the hole in the flange and the jig can be loaded and unloaded.

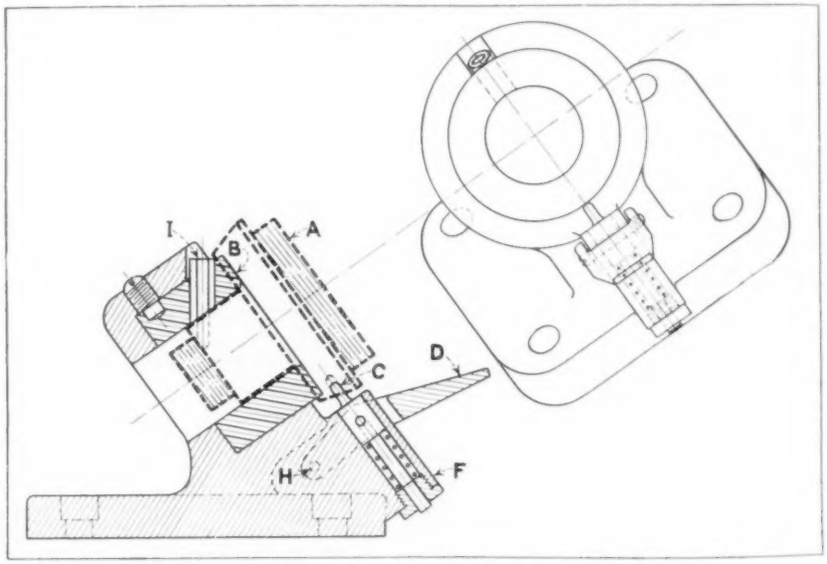
Blade Attached to a Protractor

J. H. DAVIS

Referring to the article under the above title by Theodore Kruger (*AM*—Vol. 82, page 30), may I point out that the tool described is very similar to Starrett's No. 493 protractor and depth gage, that tool having the advantage that the setting is secured by a knurled nut that locks the blade against end movement and also clamps the blade to the protractor at the angle to which it is set. Another advantage is that there are no projections at the back and it will therefore lie flat on the work.

Such an arrangement as described by Mr. Kruger cannot be attached direct to the commercial protractor without making a new stud because, as shown at *A* in the accompanying sketch, the stud is cut away at an angle greater than 90 deg. and the blade could not be clamped right.

Furthermore, I have found that where the edge of the blade is used for setting against a line it is not particularly easy to read or to set accurately. I much prefer a zero line to set the blade to and suggest that it could easily be incorporated by attaching a small tab to the blade, as at *B*. Another tool on which a zero line would be of advantage is the depth gage. There would have to be a short plain part *C* on the rule before the graduations begin, the same length as the zero line is distant from the base of the tool.



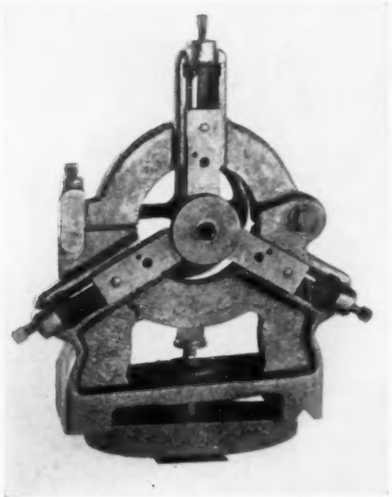
The work is held at the correct angle in a steel bushing and is prevented from turning by a spring-actuated plunger engaging a hole in the flange

Overhung Footstock Increases Grinder Capacity

JORAN KYN

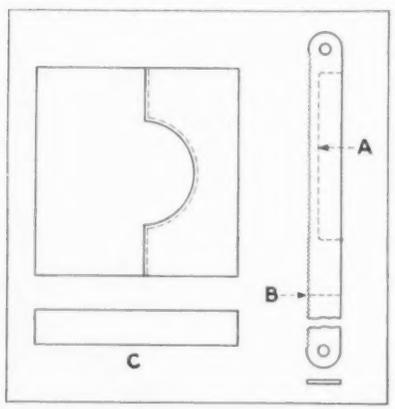
An article by J. R. Whittles (*AM*—Vol. 82, page 332) reminded me of a scheme I saw in the Savannah shops of the Central of Georgia Railway for increasing the between center capacity of a lathe.

The footstock was removed and the steadyrest was put in its place. Clamped in the jaws of the steadyrest was a bushing, as shown. The bushing was shouldered to prevent it from being pushed out of the jaws and was internally threaded to re-



Carrying an internally threaded bushing in which a threaded center engages, the steadyrest takes the place of the footstock, increasing the between center capacity of the lathe

ceive a threaded center. The center was operated by a handwheel at the rear, some of the spokes and part of the rim of which can be seen through the opening. Since the steadyrest occupied much less room on the lathe bed than did the footstock, the between center capacity of the lathe was increased by the amount of the difference.



Hacksaw blades narrowed by grinding the backs and cutting off to the required length can be used for contour sawing in the filing machine

Another Use for Hacksaw Blades

THEODORE KRUGER

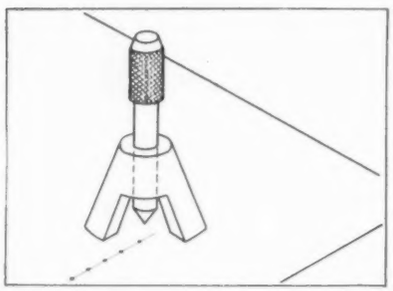
By grinding the backs of hacksaw blades to make them narrower, as shown by the dotted lines at *A* in the illustration, and cutting them off to make them shorter, as at *B*, the blades can be used in the filing machine for contour sawing. The narrowed blade will not wedge in such work as shown at *C* in sawing the half-round indicated by dotted lines.

For straight sawing, the blades need not be narrowed, but they must be cut to the correct length to suit the machine. In cutting the blades to length they are ground on both sides with a V-shaped wheel and are then broken at the point of grinding.

Handy Layout Tool

CHARLES H. WILLEY
Superintendent of Manufacturing, Hoyt Electrical Instrument Works

The prick-punch guide illustrated insures that the punch will stand square with the surface of the work. The conical bushing in which the



The slotted bushing permits a clear view of the punch and will not rock

punch is guided is slotted in three places, presenting a three-point bearing to the surface of the work and permitting the point of the punch and layout lines on the work to be clearly seen. Moreover, the three-legged base of the bushing insures that it will have an even bearing on the work and will not rock.

To Remove Scratches From Aluminum

L. C. MASON
Machine Shop Inspection
North American Aviation Company

In spite of precautions, scratches on aluminum alloy plates and extruded shapes used in airplane construction will occur. To remove them from fabricated sub and final assemblies to prevent rejection was a problem, since the assemblies were too bulky to be taken to the ordinary buffing machines.

As the result of many attempts quickly and economically to remove the scratches without damage to the parts involved, the simple method described was employed. An ordinary round typewriter eraser was used as a buffing wheel. The eraser was put on a 2-in. No. 10 round head screw, a $\frac{1}{8}$ x $\frac{1}{2}$-in. hard rubber or pyralin washer being first put under the head to prevent it from damaging the work. The eraser was locked on the screw by two nuts and the assembly was chucked in a high-speed electric hand drill.

The high surface speed and the slight abrasive action of the eraser together with the heat generated, as revealed by microscopic examination, tended to cause the alloy to flow into the scratches, obliterating them and leaving a very good finish. However, this method is not recommended for use on stressed parts.

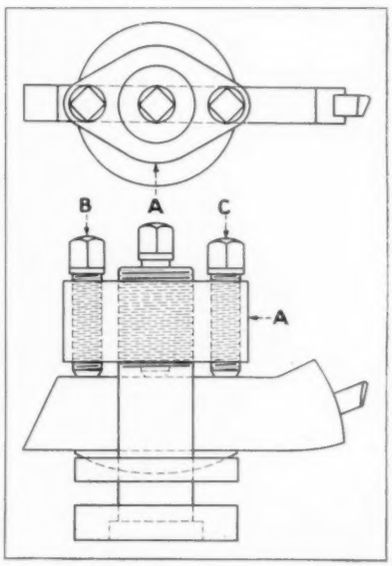
A little experimenting will indicate the correct amount of pressure to apply to avoid gouging. The flexibility of the eraser makes it especially handy to use around rivet heads and close to corners.

Heavy-Duty Toolpost for the Lathe

ADOLPH B. HARVEST
Humber Bay, Ontario, Canada

The heavy-duty toolpost described by H. W. Shepherd (*AM*—Vol. 82, page 286) reminds me of a similar arrangement that was in general use in a shop where I was employed several years ago.

As shown in the illustration, the upper part of the toolpost is threaded, and the block *A* carrying the two clamping screws *B* and *C* is internally threaded to fit the threads on the toolpost. The tool is held by the three screws, the one in the toolpost being tightened before tightening the two screws in the block. The block can easily be removed when light cuts only are to be taken. This arrangement makes a more rigid unit than that described by Mr. Shepherd.



The tool is held by three screws, one in the toolpost and two in the block screwed to the toolpost

NEWS OF THE INDUSTRY

Japanese Are Again Buying Machine Tools

Exchange permits are being granted after long delay

NEW YORK—Approximately $1,500,000 worth of general-purpose machine tools are now being bought for the account of the Japanese Army. The commission that has been in this country for some time has completed its work, and agents in this city are passing the business along to American machine-tool firms just as fast as possible.

Informed quarters are confident that there will be no hitch to cause further delay. Ample credits are said to be available. In fact, there is ground to believe that Japan has ironed out her difficulties in granting exchange permits, and that more business will be placed soon.

Unifies Functions

For a time it was thought that permits were being held up because of financial difficulties. Since then a report from Tokyo to *American Machinist* revealed that the control machine had broken down of its own weight. From the middle of April until July very few permits had been granted or even rejected. But the appointment of Seihin Ikeda, ex-president of the Mitsui interests, to the two key cabinet portfolios of Finance and of Commerce and Industry is expected to go a long way toward unifying the functions of the two ministries. Mr. Ikeda is an outstanding business man in present-day Japan, and he is counted upon to overcome the former lack of cooperation in dealing with applications for import licenses. The Tokyo report stated that a large number of permits were in sight for July, but that not many machines would be allowed to enter for purposes other than armament manufacture.

Russia is understood to be buying machine tools at about the same rate as at this time last year. Her commitments are usually heaviest in the last quarter, and from her record as a customer it can be said that some very excellent business is in prospect.

Orders for new machines are being received in good volume from Brazil, Mexico, Colombia and Chile. Business with other Latin and South American countries has been slow. Argentina is apparently not buying as much as formerly, despite the fact that the market is still active down there.

Brazil Buys

The most encouraging spot in South America just now is Brazil. Well-scattered orders for machine tools and industrial equipment have been received even though the monetary situation is still muddled. Informed quarters believe that the financial difficulties will soon be cleared up, and that the real buyers in Brazil will be encouraged to come into the market by early fall.

Mexican orders have experienced a good upturn in the last fortnight. The exchange rate of the peso is still considered unsatisfactory by Mexican buyers, but nevertheless they are expected to take American equipment in greater volume. Internal business conditions in Colombia are good, and business there is considered better off than in nearby countries. Moneyed men in Colombia are going ahead with projects looking toward greater industrialization of the country.

Export orders for used equipment continue on a slight upgrade. Great Britain and South America are the best spots, and there are strong indications that France will come into the market for heavy equipment. Japan is doing some buying of used equipment, but little has been heard of the large orders that the Chinese had under consideration.

LATE *NEWS* WIRES

BOSTON—Bath Iron Works awarded contract to build two destroyers for United States navy at total cost of $10,134,000. Bethlehem Shipbuilding Corporation awarded four cargo vessels for American Export Lines at expenditure of $10,236,000.

WASHINGTON—Organized labor thinks the Bureau of Foreign and Domestic Commerce has been kept in the dog house long enough. Export trade has been such an important source of employment for a year that labor leaders in lines benefited want to see the government do more to stimulate foreign trade. As labor is familiar with legislative processes, its agents know that efforts to secure appropriations are most effective when put forth at this time of year when estimates are being made up for next year. Hence the Bureau of Foreign and Domestic Commerce may benefit.

MILWAUKEE—Allis-Chalmers has secured contract for four 20,000-hp. hydraulic turbines on the Grand River project in northeastern Oklahoma on bid of $700,000. It also is low bidder on water wheel generators for Chickamauga Dam.

MEMPHIS—Rust Brothers reported planning to build a plant here to manufacture 1,000 mechanical cotton pickers a year. Two units will be made. One is a large double-unit tandem picker mounted on its own tractor and intended for large plantation operation. The other will be a single-unit picker pulled by tractor for small farms.

CHICAGO—Committee for Industrial Organization has announced that it will hold conference here preliminary to a drive to organize farm equipment plant workers in one union. Heretofore these workers have been organized by several C.I.O. affiliates including the Steel Workers Organizing Committee and the United Automobile Workers.

WILLIAM L. BATT

Human Relations Will Be Silver Bay Topic

Leaders of industry will gather at Silver Bay on Lake George, N. Y., from Aug. 31 to Sept. 3 to take part in discussion of the many topics in the complex field of human relations. The sessions will open with a statement by the chairman, C. R. Dooley, industrial relations manager, Socony-Vacuum Oil Co. Several outstanding speakers will appear before the conference, including William L. Batt, president of SKF industries, Inc. The program follows:

WEDNESDAY, AUG. 31

Afternoon

Discussion Groups

1. "The Man Over Forty." Leader: James J. Wadsworth, chairman of the N. Y. State legislative committee studying this subject.
2. "Wage and Salary Administration." Leader: D. W. Weed, General Electric Co.
3. "Lay-Off Plans, Seniority, Dismissal Compensation." Leader: Milton C. Hagen, personnel manager, Bayonne refinery, Standard Oil Co. of New Jersey.

Evening

"The Principles of Right Relations in Industry," by Dr. George H. Taylor of the University of Pennsylvania, and arbitrator for the full-fashioned hosiery industry.

THURSDAY, SEPT. 1

Morning

"Fusing the Interests of Labor, Management and Consumer," by William L. Batt, president of SKF Industries, Inc.

Sectional Conferences:

1. "The Foreman as an Interpreter of Company Policy and Economic Fact." Leader: Lawrence A. Appley, director of training, Socony-Vacuum Oil Co.
2. "Handling Grievances." Leader: Glenn L. Gardiner, assistant to the president, Forstmann Woolen Co.
3. "Rating Plans for Employees." Leader: A. F. Kindall, assistant treasurer, General Foods, Inc.

Evening

"Social Security Act in Operation and in Prospect," by Frank B. Cliffe, assistant comptroller, General Electric Co.

FRIDAY, SEPT. 2

Morning

"Labor Policies—Content of; Developing; Administering; Publicizing," by Thomas R. Jones, president of American Type Founders, Inc.

Evening

"Unemployment." Speaker to be announced.

SATURDAY, SEPT. 3

"What's Ahead for Management," by Prof. Edwin R. Schell, Massachusetts Institute of Technology.

Hold Your Breath

For the next few weeks, business management will be well advised to watch the labor situation closely, and to keep its fingers crossed. In organized labor ranks, high tension is evident, and nerves are strained by three developments: (1) The steel wage hearings in Washington; (2) The imminence of a split into pro- and anti-Martin unions in the United Automobile Workers; (3) A widening of the breach between C.I.O. and A.F.L., which had been narrowed recently.

Best bets on outcome of these is as follows: (1) The steel wage rates will remain where they are, with postponement of any revision until the present upturn in operations reaches a plateau; (2) John Lewis will not enter the U.A.W. fight personally, if the union can be held together in some fashion until Governor Murphy has his shot at reelection—but C.I.O. will step in with an advisory committee after that; (3) A.F.L. will wait to see whether it can affiliate David Dubinsky's dress makers and Homer Martin's factory hands before it goes even part way to end the labor union war.

Meantime, while these things are going on behind the scenes, the beginnings of a new organization drive is evident. Textile workers in the South, furniture workers, and scattered metal-working plants here and there will be first to feel this drive, which is geared with the administration of the wage-hour law. The law goes into effect Oct. 24, and a union campaign will be in full swing by that time, to push for rapid upping of the obligatory 25¢ minimum to allowable 40¢ minimum.

Arc Welding Papers Are Being Judged

ITHACA, N. Y.—Papers submitted in the $200,000 award program of the James F. Lincoln Arc Welding Foundation are being judged at Cornell University by 30 jurors from the engineering departments of various colleges and universities. The work is being done under the direction of Dr. E. E. Dreese of Ohio State University. The jury of award will consult experts or outstanding authorities in order to appraise the papers properly.

In judging the papers, the jury will evaluate original studies conducted by engineers, designers and architects over a period of fifteen months between the announcement and close of the Foundation Award Program. The subject studied during this period was the application of the arc welding process of construction to the design of all types of products and structures. Rewards for the studies will be in 446 individual amounts ranging up to $10,000, with the grand award of $13,700.

A. W. ROBERTSON

Management Congress in Washington

American industrial management will have a chance to defend itself against the attacks of government and labor, when the seventh International Management Congress meets in Washington from Sept. 19–23. It will bring here speakers from democratic and totalitarian countries, thereby giving the public a good chance to evaluate progress in management and human relations under a system of free enterprise as compared with a dictatorship.

Three objectives are laid down by the congress program: (1) to interchange world experience in all phases of management, thereby aiding the economical production and distribution of goods and services; (2) to give management an opportunity to appraise the social and economic results of its work; (3) to give leaders of thought and action the opportunity to advise management in its relations with the public, labor and government.

Approximately 200 papers have been prepared by American and European authors. The sponsoring group is the International Committee of Scientific Management, of which the American affiliate is the National Management Council. A partial program follows:

"Management's Responsibilities to Society," by A. W. Robertson, chairman, Westinghouse Electric & Manufacturing Co.

"Influence of Technical Progress upon Social Development," by Dr. Carl T. Compton, president, Massachusetts Institute of Technology.

"The Social Aspects of Rationalization," by G. Seebauer, director, Reichskuratorium fur Wirtschaftlichkeit.

"Reshaping Distribution to Modern Economy," by Oswald W. Knauth, president, Associated Dry Goods Corp. of N. Y.

"Coordination of Production and Distribution," speaker from Sweden, to be announced.

"The Balancing of Incentive and Security," by Ralph E. Flanders, president, Jones & Lamson Machine Co.

"Employee Security as a Responsibility of the State," by Gino Olivetti, chairman, Ente Nazionale Italiano per l'Organizzazione Scientifica.

"Psychological Foundations of Management," by Dr. Henry C. Link, director, Psychological Corporation.

"Human Aspects of Management," by Maurice Ponnthiere, Directeur de l'Ecole Organisation Ccientifique du Travail de Paris.

"The Continuance of Free Enterprise," by W. J. Cameron, Ford Motor Company, and Dr. A. Basch, general manager, United Chemical & Metallurgical Work, Prague.

"Labor's Aims and Responsibilities," by Robert Watt, American workers delegate to International Labour Organization.

"Management's Aims and Responsibilities," by Lewis H. Brown, president, Johns-Manville Corporation.

"The Public's Concern in Industrial Harmony," by William Allen White, editor, *The Emporia Gazette*.

"The Machinery of Industrial Conciliation and Arbitration," speaker from England, to be announced.

"International Cooperation in Management," by Th. Limpberg, professor of business economics, University of Amsterdam.

"Social and Economic Aspects of Management," speaker from International Labour Office, to be announced.

Sales to South Africa Should Be Good in 1938

WASHINGTON—Imports of industrial machinery into the Union of South Africa during 1937 were valued at approximately $17,750,000, to record a gain of 17 per cent over imports valued at approximately $15,215,000 in 1936, according to a report to the Department of Commerce by the office of the American Trade Commissioner at Johannesburg. Imports during 1937, however, were considerably below those during 1935, the peak year, valued at approximately $31,785,000, the report stated.

Our Participation

At present the United Kingdom, the United States, and Germany, in the order named, are the chief suppliers of industrial machinery to the South African market. American participation is particularly strong in tractors and parts, factory plant, and miscellaneous items for mining and industrial purposes. During 1937 increases were noted in imports of American-made air compressors, boilers, cranes, shears and elevating machinery, engines of all types, lathes, pumps, woodworking and miscellaneous items.

Local observers in South Africa stated that the outlook for industrial machinery imports during 1938 was very good. One of the factors which will influence this trend is the fact that there is a prominent trend in that country away from the development of the gold mining industry and toward the further development of secondary industries. It is believed that United States participation in South Africa's industrial machinery trade could be materially increased by proper representation of interested American firms and individuals in that country.

A.S.T.M. Has Committee on X-ray Inspection

PHILADELPHIA—Committee E-7 on Radiograghic Testing was set up by the American Society for Testing Materials, because of the interest in this subject at the annual meeting in Atlantic City. H. H. Lester of the Watertown Arsenal is chairman, and Earnshaw Cook of the American Brake Shoe & Foundry Co., is secretary.

Following the usual procedure of the parent body, the committee membership includes producers of articles subject to X-ray inspection, users of products subjected to this inspection, makers of X-ray apparatus and radium capsules, and research workers. The committee is engaged in studies preliminary to the development of workable standards and rcommended practices covering the acceptability and applicability of radiographic examination.

Locomotive Shops Have Less Work in Hand

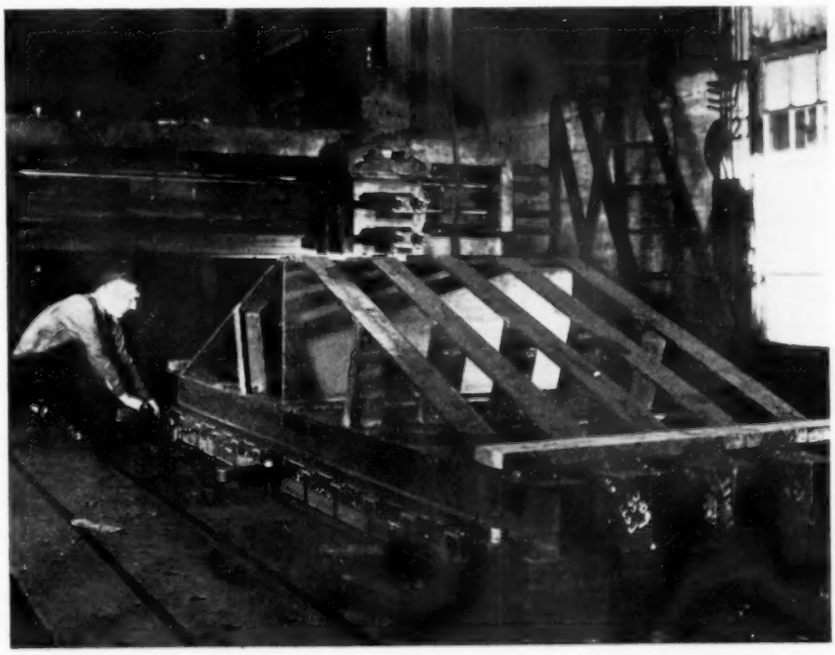
WASHINGTON—Unfilled orders for railroad locomotives in manutacturers' shops at the end of June totalled 88 units as compared with 403 in June, 1937 and 131 in June, 1936. Seven locomotives in this total were for steam types to go abroad. The trend has been generally downward since a peak in March, 1937, according to figures compiled by the Bureau of the Census, Department of Commerce.

Westinghouse Gets Order for Locomotive Units

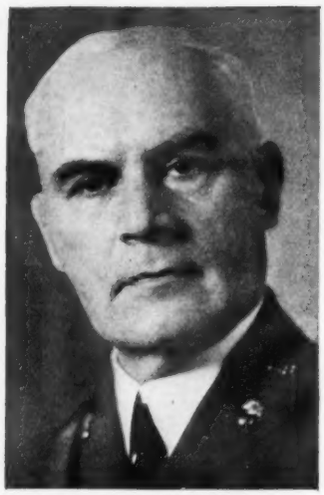
EAST PITTSBURGH—A contract amounting to approximately $1,700,000 has been awarded the Westinghouse Electric & Manufacturing Co., to build electrical equipment for ten new 100 miles-an-hour GG-1 type locomotives ior passenger service on the electrified sections of the Pennsylvania Railroad between Harrisburg, New York and Washington.

Three Westinghouse plants will share in building the major portion of the equipment for these rail giants; East Pittsburgh, Pa., making the motors and control units; Sharon, Pa., the transformers; and Newark, N. J., sensitive relaying equipment.

As nearly 60,000 man-hours of work are required to build the electrical parts for each locomotive the total employment involved in the contract amounts to 600,000 man-hours. After the work is in progress, experienced men will be recalled.



Savings of approximately 25 per cent were secured by the Westinghouse Electric & Mfg. Co. by fabricating 4,100 sq. ft. of floor plates by welding. These plates were strain annealed and machined on the top surface. This set-up is for machining a bridge-type floor plate on the underside preparatory to mounting tunnel equipment



MAJ. GEN. TSCHAPPAT

Gen. Tschappat Retires

WASHINGTON — Formal announcement of the retirement of Major General William H. Tschappat was made July 19 by the Secretary of War. On Aug. 31 General Tschappat will have attained the statutory retirement age of 64 years. He recently concluded his tour of duty as chief of ordnance, and has no plans for the future other than reducing to writing some of the lessons of his experience.

Prior to his four-year term as chief of ordnance General Tschappat had served in the Ordnance Department as assistant to the chief of ordnance, as chief of the manufacturing service and as head of the technical staff. From 1922 to 1925 he was in command at Aberdeen Proving Ground.

Welder Manufacturers Prepare Standards

DETROIT—Considerable progress was made on the revision of standard transformer specifications by the Resistance Welder Manufacturers Association, during a meeting at the Recess Club on July 14. A committee headed by A. D. Jardine of the Welding Machines Mfg. Corp. made a detailed study of the changes proposed. The specifications are to be completely rewritten and submitted to the association at its next meeting on Sept. 14.

Foundry Equipment Orders Dropped in June

CLEVELAND—The unfilled orders index reported for June by the Foundry Equipment Manufacturers Association fell to 140.2, as compared with 157.5 for May and 372.8 in June 1937. Shipments in June stood at 78.5, which was down from an index of 91.3 in May and 232.1 in June, 1937.

Auto Plants For India

Nilkanth Chavre, technical head of the Garware Motors, Ltd., Bombay, India, has been visiting Ohio for the purpose of purchasing machinery for a plan projected to manufacture automobiles in India. The plant would be the first to build complete cars there.

Small Business Men Will State Their Views

AKRON—The formal start of a definite, nationwide movement by small business men to correct evils in our national picture will take place at Syria Mosque Temple, Pittsburgh, on Sept. 13–16. The National Small Business Men's Association, Akron, Ohio, will hold a convention, and representatives from every congressional district are expected to be present. Differing from the session staged several months ago in Washington, this meeting will be featured by addresses both pro and con about national problems by forefront leaders.

In advance of the Pittsburgh convention and pending the adoption of a formal program of action by the members, a tentative and necessarily incomplete program of aims and purposes has been followed by the Association. Thousands of producers and distributors of America's goods have been stirred into action by the National Small Business Men's Association, which has been asking them if they want:

1. A return to sanity in government and a balancing of the federal budget.
2. Fewer, better and more easily understood laws.
3. A thorough revision of our entire tax system to make it fair and to eliminate the undivided profits and capital gains tax.
4. An end of government meddling, experimenting and rule-making that handcuffs business.
5. Free speech, an unrestricted press and radio.
6. Elimination of pressure upon and interference with the proper functioning of our courts.
7. Reduction in tax-free bonds.
8. Income taxes collected from all public employees on the same basis as from private citizens.
9. The use of relief funds for political purposes stopped.
10. A careful study of the anti-trust laws for the definite purpose of making them clearer and more understandable to business men, and, if necessary, revision of these laws to insure free enterprise without putting any type of business in a straitjacket.
11. Correction of existing errors in the Social Security Act which impose unnecessary penalties upon both employers and employees.
12. Revision of the Wagner Labor Relations Act—an end of violence and trespassing, unfair government dictation and unequal responsibilities between employers and employees.

Index of Machine Tool Orders

Based on Volume of Shipments for 1926

Month	Index of Orders: Domestic	Index of Orders: Foreign	Index of Orders: Total	3 Months' Average Index	% Foreign to Total Orders
1937 — June	137.6	54.2	191.8	227.6	28
July	115.4	55.7	171.1	190.5	33
August	129.5	50.3	179.8	180.9	28
September	119.0	91.7	210.7	187.2	44
October	89.1	62.9	152.0	180.8	41
November	63.3	64.4	127.7	163.5	50
December	53.5	89.2	142.7	140.8	63
1938 — January	43.2	75.2	118.4	129.6	63
February	48.7	27.0	75.7	112.3	35
March	50.5	56.5	107.0	100.4	52
April	43.9	46.4	90.3	91.0	51
May	34.8	31.9	66.7	88.0	47
May	35.7	34.5	70.2	75.7	49

Distribution of Orders

Average Index of Individual Companies Based on 1926 Level of Business	Companies in Per Cent of Total Number Reporting: 1936 3rd Quar.	1936 4th Quar.	1937 1st Quar.	1937 2nd Quar.	1937 3rd Quar.	1937 4th Quar.	1938 1st Quar.	1938 2nd Quar.
200–up	15.8	28.4	31.6	38.5	33.4	23.0	13.5	10.0
100–199	28.8	30.2	32.8	29.1	30.2	23.2	18.3	12.4
60– 99	22.9	19.5	16.4	15.1	15.7	18.6	19.3	19.5
20– 59	21.7	15.2	12.2	11.4	12.7	22.0	30.3	31.3
Less than 20%	10.8	6.7	7.0	5.9	8.0	13.2	18.6	26.8

DETROIT LETTER

Government pump priming and big crops expected to provide car sales impetus . . . August will be chief retooling month . . . Production stabilized to remarkable degree this year . . . Chrysler going to synthetic enamel finish on all of its cars

DETROIT—With the old car year fading and the new car year in sight, the automobile industry is occupied principally in preparing to give the 1939 model year a royal welcome. There will be few regrets that the "38" year is ending. It proved to be as close to a "washout" as car makers ever hope to see. The new year promises better things; so Detroiters, with their usual buoyancy, are in good spirits again despite the fact that the lowest production period of the year is immediately ahead.

August will see most of the automobile factories shut down for retooling. Chrysler divisions will be down almost all month, while Ford too is scheduled for an idle period. General Motors will stagger its closings so that some of its plants will be in operation during August. These shutdowns do not mean that employment will be flat in Southern Michigan. Actually, about 25 per cent of automotive workers are on the job when retooling is in progress. Chrysler, for example, has announced that 15,000 men will be employed while its factories are idle.

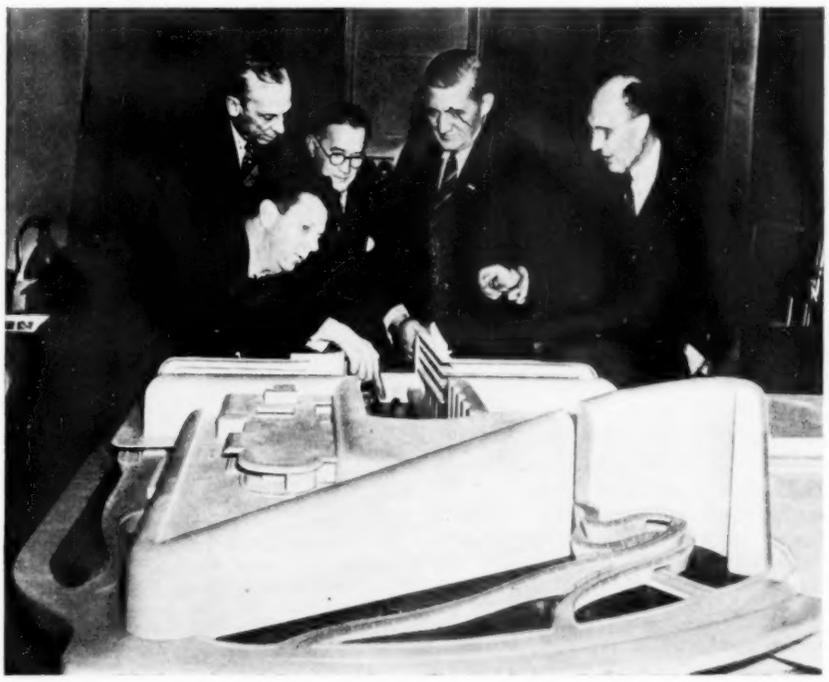
No one is yet predicting what the total output of cars will be in the final four months of the year. That will depend in large part on the extent of the expected recovery. Yet all automotive sales executives are mindful of the fact that the huge governmental pump-priming program is bound to pour substantial sums into money-spending channels and that farmers in many parts of the country, despite relatively poor prices, are harvesting bumper crops. An important slice of new car sales made in the recovery years of 1934, 1935 and 1936 were traceable directly or indirectly to plentiful disbursements by Uncle Sam.

For several years car makers have been trying manfully to achieve greater stabilization of employment. That was why fall introductions were adopted. It is notable, therefore, that unwittingly the industry attained probably the greatest production stability in its history in a poor year. From Jan. 1 to May 31 of this year car assemblies varied from a low of 202,589 units during February to a high of 238,598 units during March, a spread of only 36,009 units. If that degree of stability could be maintained on a higher level every year, both the industry and the New Deal would be happy.

Evidences are at hand that the '39 model year is nearby. Parts factories in Detroit, Toledo and Dayton, Ohio, have begun to turn out small quantities of new parts. Before Sept 1 parts manufacturing departments of some automobile companies will be starting new work. Steel releases thus far have been light, but sizable tonnages should be placed in the next 30 days.

What will happen to car prices for 1939 is anyone's guess. With steel prices down sharply and with many automotive men holding the belief that present car prices have been a big stumbling block in the industry's sales path this year, it would be surprising if car companies did not make some gesture in the direction of lower prices.

Synthetic enamels will come into their own during 1939. The latest convert is the Chrysler organization which will go for it "whole hog." The synthetic enamel vogue started some years ago with developments by the Ford Motor Co. which began to use it on the V-eight. It soon became standard on all Ford models. More recently it has been used by Plymouth. Now equipment is being installed in all Chrysler divisions and in Briggs, according to reliable reports, to provide all Chrysler cars next season with a synthetic enamel finish. Neither General Motors nor the so-called independent companies have gone to synthetic enamels. Two years ago Hudson engineers developed a new lacquer which they claimed gave even better results than synthetic enamel. Hudson spent considerable money installing special equipment for the use of this lacquer. At that time Studebaker began using a similar material.



"Highways and Horizons," the General Motors' exhibit at the New York World's Fair, will present a panorama of traffic control and automobile transportation on the superhighways of the future. Norman Bel Geddes, designer of the exhibit, explains details to Alfred P. Sloan, Jr., chairman; Richard H. Grant, vice-president; William S. Knudsen, president and Charles F. Kettering, vice-president

WATCHING WASHINGTON

Wage-hour administrator Andrews will move slowly until confirmed . . . He will probably follow Miss Perkins' idea on "prevailing wages," to the hurt of the under-priviledged and small industries . . . The act may precipitate a class struggle in '40

McGRAW-HILL WASHINGTON BUREAU
(Paul Wooton Chief)

WASHINGTON—A wages and hours administrator is in much the same position as was a food administrator during the war. He is called upon to take action that affects the daily life of nearly every member of the population. Food administrators in European countries would become so unpopular in six months that they would have to be removed from office to satisfy the popular clamor. In the United States there was such an abundance of food that relatively little restriction was necessary.

Elmer F. Andrews, the new wages and hours administrator, faces a task that will be unpopular from the start. Had he been appointed before the adjournment of Congress he might have had some searching sessions with a Senate committee, but at worst he would have known his fate before he gave up his job. Since he received his job by recess appointment he cannot be confirmed until the Senate again meets, which probably will not be until January.

He Will Probably Stall

In the meantime, if Mr. Andrews takes any action that disturbs industry in any section he may arouse the opposition of a group of Senators. The determined opposition of one Senator frequently delays confirmations for months. If the administrator does not crack down, the labor unions will be on his neck. As a result, he will have horns to his dilemma like cannon at Balaklava. He probably will do all the stalling he can until he is confirmed.

As a protege of Secretary Perkins, he is expected to follow her policies already made clear by the manner in which the Walsh-Healey act has been administered. That law requires that prevailing wages be paid. The "prevailing" wage that Miss Perkins finds usually is the union scale of the nearest large city. With the higher wage required contractors want the most efficient workmen. As a consequence, they bid against each other for the exceptional workmen. The higher rate established by this competition then becomes the prevailing wage when the next contract is let. All of this means that labor cost is added to the price of the product, so the taxpayers pay more and more for public supplies.

Efficient Workers Only

Much the same outcome is expected when the wages and hours law really becomes effective. If forced to pay a high minimum wage, employers will choose the most efficient workers. The statute is regarded as a calamity to the less efficient and the underprivileged. Its effect will add materially to the handicaps under which small industries operate. The larger concerns and the industries able to pass on their costs will be in a much better position.

The possibility of passing on the wage increase to the consumer, makes price-fixing seem a necessary corollary to a wages and hours law. Many believe that the wages and hours law will be found unconstitutional before a serious effort to secure price-fixing legislation is made. If test suits reach the Supreme Court in the usual time, the law may be nullified in time to make the question the big issue in the 1940 campaign. This probably would precipitate a class vs. class struggle of serious proportions.

An Indirect Wage Boost

One of the purposes behind labor's various efforts to obtain maximum-hour laws is to secure an indirect wage boost by making necessary an increase in the amount of overtime. Reports reaching Washington indicate that many employers are planning to work on a shift basis so as to reduce or eliminate overtime. The practice of operating a five-hour morning shift and a five-hour afternoon shift may be adopted by the smaller industries, at least, judging from the reports being received. In addition to the elimination of overtime, it would benefit the employer, now working one eight-hour shift, in that he could utilize his equipment for a longer period. This is expected to become more important, as the wages and hours law, all agree, will stimulate mechanization. With a greater capital investment in machinery there will be an additional inducement to operate the plant for a longer period. From such an arrangement would come a spreading of work that would be in the public interest.

Another Felony

While the CIO lost out at the last session of Congress in the effort to make the Walsh-Healey act more drastic it did slip through a revised Bynes bill which goes far beyond the transportation of strikebreakers. That act makes it a felony to send anyone across state lines to interfere or obstruct collective bargaining. If a company having headquarters in one state should have a strike at a branch in another, it would violate this law were it to send a lawyer or a labor relations expert to advise the branch management.

Rail rate increases probably won't bring in more money; if they do it won't be spent for new equipment.

DR. LUBIN NEXT?

Isador Lubin was Miss Perkins' choice of the administrator of the wages and hours act. Members of the monopoly investigating committee, who attach great importance to the breaking up of frozen prices, persuaded the President that he is essential to that study and should not be taken away from it. But the first administrator may not last six months. So Dr. Lubin may be the second appointee. He should find the position more tenable after impractical features of the act are demonstrated.

Reiteration by Jesse Jones, chairman of the RFC, that banks should get into installment and personal lending is regarded by some of the banking authorities as tantamount to a request that producers act also as wholesalers and retailers. To collect small sums at frequent intervals and to repossess forfeited property, would mean the creation of machinery which the banks do not have at present. Personal loans involve a higher percentage of loss than ordinary commercial credit, it is pointed out, and necessarily call for higher interest rates.

G. P. PASSMORE

C. M. PETER

GEORGE S. ROGERS

PERSONALS

GEORGE P. PASSMORE has been appointed manager of manufacturing, Steam Division, South Philadelphia Works, Westinghouse Electric & Mfg. Co. He succeeds A. R. ALLARD who has resigned to accept a vice-presidency of General Steel Castings Corp. Mr. Passmore joined Westinghouse in 1921 as a machinist. Subsequently, he filled the positions of shop foreman, tool designer, layout draftsman, superintendent of tool design and, until this last advancement, superintendent of heavy manufacturing.

C. M. PETER. formerly export sales manager, and for the past fifteen years managing director of Black & Decker, Ltd., has joined the Fellows Gear Shaper Co. as general sales manager. Mr. Peter will make his headquarters at the Detroit office, 616 Fisher Building. He succeeds W. F. SLOMER, who has been ill for the past eighteen months, and has found it necessary to give up an active connection with the company.

WILLIAM H. FRANCE, formerly of the Audiffren Refrigerating Machine Co, Providence, R. I., has been made executive vice-president and general manager of the American District Steam Co., North Tonawanda, N. Y. He will assist in the manufacture and sale of new products still in the development stage.

WILLIAM B. JOHNSTON, formerly vice-president and treasurer of the Ideal Furnace Co., Detroit, has been eected pres ident to succeed the late BYRON H. EDWARDS.

Mr. Shipman, Jr., of Jones & Shipman, British machine tool firm of Leicester, Eng., will visit the United States and Canada, during the latter part of the year, possibly as early as September, for the purpose of negotiating with machine-tool and small-tool firms for $150,000-$200,000 worth of products for resale n Great Britain.

THOMAS WEISKOPF, formerly assistant superintendent of the Massillon, Ohio, plant of the Union Drawn Steel Div., Republic Steel Corp., has been appointed superintendent, and FRANK A. GARVEY has been made assistant superintendent.

C. W. WOOD, fromerly with the Timken Co., has been elected secretary-treasurer, Reo Motor Car Co. THOMAS CAMPBELL and PIERCE BRADLEY, New York, were elected to the board of directors.

BUSINESS ITEMS

G. S. Rogers & Co., 228 No. LaSalle St., Chicago, has been formed to manufacture liquid and solid carburizers, heat-treating and drawing salts, quenching oils, core oils, cutting oils, drawing compounds, and metal cleaners. GEORGE S. ROGERS, president of the new company, resigned last January as general sales manager of E. F. Houghton & Co. He has had extensive experience as consulting chemist and metallurgist for well-known steel and automotive concerns.

To provide more complete distribution for "Timken Graphitic" steels for dies and tools, the Steel & Tube Division of The Timken Roller Bearing Co., announces the appointment of A. Milne & Co., 745 Washington St., New York City, 109 Broad St., Boston, and 21 North May St., Chicago. This company will cover the six New England states, New York metropolitan district, eastern New York state and northern New Jersey. The Chicago office will cover the states of Illinois, Iowa, Missouri, Wisconsin, Minnesota and northern Indiana.

The Hamilton Steel Co., E. 131st & Taft Ave., Cleveland, will cover the state of Ohio, excepting the Dayton district and Toledo.

The Craine-Schrage Steel Co., Detroit, will supply the state of Michigan and Toledo.

Quality Steels, Inc., Dayton, Ohio, will cover the Dayton district.

Coulter-Sibbett Steel Co., 240 Eighth St., Oakland, Calif., will handle all accounts in northern California.

Monarch Machine Tool Co., Sidney, Ohio, has available a 100 ft. 16-mm. colored motion picture film which shows the procedure by which Monarch lathe beds are flame hardened. Standard lantern slides are also available. This film, or the slides, will be loaned without obligation to technical societies and industrial groups.

The Dual Remote Control Co., 31776 Northlawn Ave., Detroit, is starting to manufacture dual controls for automobile radios. The device was invented by STANLEY CLAMB, president. PETER C. VAN DER MEERE is production manager, and ARTHUR WILLIAM LANG is general manager.

Breuer Electric Mfg. Co., portable electric blowers, industrial vacuum cleaners and sprayers, has moved its office and plant from 825 Blackhawk St. to 5100 N. Ravenswood Ave., Chicago.

Etablissements Henri Benedictus, Belgian machine tool dealer in Brussells, has moved to 34-37 rue Melsens, and will occupy the building acquired in 1919 by Société Anonyme Belge Alfred Herbert, which has been dissolved, and for which the Belgian firm has taken over the agency. In addition, Benedictus handles a number of the better-known American machine tools and small tools, as well as British, French and German equipment.

The Ferracute Machine Co., Bridgeton, N. J., founded in 1873 by OBERLIN SMITH, pioneer in power press building, is celebrating its 75th anniversary. In 1937 the controlling interest was purchased by GEORGE E. BASS, who is now actively conductng the business as president. Assisting him are: HENRY A. JANVIER, vice-president; LUTHER C. MEYERS, general manager, and PHILIP M. MEYERS, superintendent of works.

The Billings & Spencer Co., Hartford, Conn., has acquired the Windsor Automatic Co., Windsor, Vt., makers of the "Di-Matic" automatic screw machine, and the business has been moved to Hartford. R. R. CAMPBELL, former president of Windsor, and ELMER E. KELLEY, inventor of the Di-Matc, are now associated with Billings & Spencer.

The Bethlehem Steel Co. has transferred NORMAN R. DOWNIE, formerly engaged in the sale of wire rope in the New York district, to the home office at Bethlehem, where he will assist C. M. BALLARD, manager of sales of wire rope.

Bravo-Doyle Co., Pittsburgh, will represent the McKay Co., Pittsburgh, as distributor for the complete McKay line of arc-welding electrodes in Western Pennsylvania, Eastern Ohio and all of West Virginia.

Percy M. Brotherhood & Son, machine tool dealers and agents, have transferred their offices from 114 Liberty St., New York, to the South Ferry Bldg., 44 Whitehall St.

Revere Copper & Brass Inc. has opened an office at 915 Second National Bldg., Houston, Texas, with HANS O. HOWARD, formerly of the Dallas office, in charge.

Tishken Products, Inc., maker of roll forming machines, has moved into a new plant at 8531 Livernois Ave., Detroit.

Japan Fails to Get German Help

TOKYO — It appears that Vice-Admiral Takuo Godo, "people's envoy" to Germany, director of the Showa Steel Works and one-time Minister of Commerce and Industry, failed to satisfy the earnest expectations for German-Japanese cooperation in machine-tool making, as envisaged by the Cabinet's planning board some time ago. Vice-Admiral Godo recently returned to Tokyo after six months of fruitless negotiations with industrial and party leaders in Berlin.

The *Nippon Kogyo Shimbun* (Japan Industrial News) understands that the following three reasons were responsible for the noncommittal attitude of the Nazi leaders:

1. Germany is too busy with her own armament problems.
2. There is an acute shortage of engineers and skilled machinists in Germany, and certainly none are available for Japan.
3. Germany is reluctant quite generally to help build up a competition abroad for her own machinery industry.

The Tamagawa Machine Works of the Mitsubishi Heavy Industries, Ltd., is in the market for milling machines, lathes and other tools, for which the firm has earmarked an amount of 5,000,000 yen. Most of the equipment will be ordered from the United States, since European firms are not able at present to accept orders on the basis of short-term delivery.

More Orders to U. S.

Following its recent attempt to manufacture chemical plant equipment under its own management, the Japan Soda ("Nisso") Co. has decided to take up metal-working machinery as well, and this in a big way, in order to come in for the benefits of a government license. This means that Nisso is going to install upwards of two-hundred primary machine tools, because two hundred is the minimum qualifying for a license. Orders will go to the United States, with a few exceptions.

The Ministry of Commerce and Industry, Tokyo, is preparing a list of machines needed for installation at the projected National Machinery Experimental Station. Appropriations for the current fiscal year are not very big, but 300,000 yen worth of gages and measuring instruments will be bought.

To meet the vastly increasing orders for locomotives, vehicles and repair work, the Manchuria Machinery Co., Ltd., plans an expansion of its shops which will involve the purchase of machines costing 2–3 million yen. The Manchuria branch of the Mitsubishi Heavy Industries, Ltd., acts as agent for the machinery company.

In view of the increasing difficulties in liquidating Japanese transfer accounts, Swedish steel and machinery interests represented in Japan by Gadelius & Co., Ltd., have decided to suspend shipments to Japan and instead have Japanese manufacturers produce Swedish machinery under license contracts. Under this arrangement, the Kawasaki Dockyard Co., Ltd., obtained the manufacturing rights to the patents of Imoindustri—A/B, Stockholm.

Japanese Bearings

Likewise the distributor in southern Japan for the SKF concern announced that a patented roller bearing design would be produced in Japan shortly under royalty to the Swedish firm.

It is further learned that the Kokusan Seiki Kaisha (Domestic Machine Mfg. Co.) has begun to produce "Warner type" turret lathes, although it is doubtful whether a manufacturing license has been awarded.

Tokyo Kikai (Tokyo Machinery) has turned out an experimental model of Herbert No. 4 lathe, and also Nakajima Kikai is reportedly building Herbert designs.

MEETINGS

AMERICAN SOCIETY FOR METALS. Twentieth Annual Metal Show and Exhibition. Convention Hall, Detriot, Oct. 17–21. W. H. EISENMAN, secretary, 1016 Euclid Ave., Cleveland, Ohio.

AMERICAN SOCIETY OF TOOL ENGINEERS. Semi-annual meeting, Oct. 14–15. Pittsburgh, Pa.

NATIONAL INDUSTRIAL ADVERTISERS ASSOCIATION. Sixteenth annual conference, Sept. 21–23. Statler Hotel, Cleveland. Committee chairman, STANLEY A. KNISELY, advertising director, Republic Steel Corp.

NATIONAL SAFETY COUNCIL. National Safety Congress, Oct. 10–14. Stevens Hotel, Chicago.

SEVENTH INTERNATIONAL MANAGEMENT CONGRESS, Washington, D. C. Sept. 19–23.

SOCIETY OF AUTOMOTIVE ENGINEERS. National Aircraft Production Meeting, Oct. 13–15. Ambassador Hotel, Los Angeles, Calif.

OBITUARIES

R. B. HURLBURT

RUSSELL B. HURLBURT, assistant export manager of the Pratt & Whitney Co., 17 Liberty St., New York, died July 17 after a six weeks illness. He was 51. Mr. Hurlburt was foreign representative for Pratt & Whitney in London, Paris and Brussels from 1929-1936.

JOHN WATSON BOYNTON, a founder and director of the Union Twist Drill Co., died July 11.

F. Y. ROBERTSON, vice-president, U. S. Smelting & Refining Co., died at his home at Southfield Point, Ill., July 12 at the age of 80.

RULUFF R. STERLING, president and an organizer of the Sterling-Skinner Mfg. Co., died recently.

MICHAEL J. WALSH, founder of the M. J. Walsh Machinery Co., Milwaukee, and president at his retirement in 1933, died recently.

CHARLES H. RICHARDS an official of All-Steel Equipment Co., Aurora, Ill., died July 11 at the age of 63. He was formerly superintendent, Knapp Bros. Mfg. Co., Chicago.

DAVID M. AVERILL, general works manager of the Nash-Kelvinator plants in Racine and Kenosha until his retirement last year due to ill health, died July 17 at the age of 59.

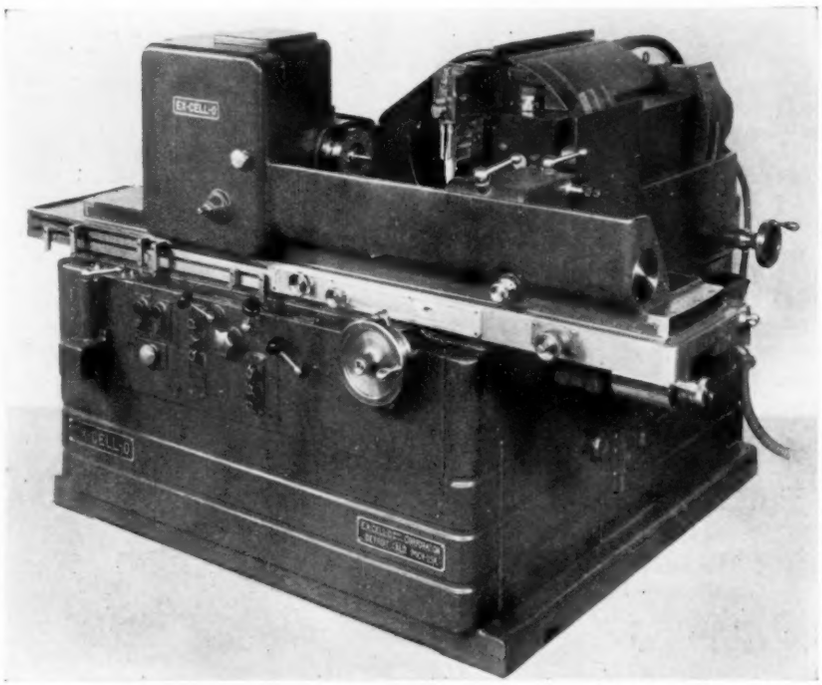
Mr. Averill began his career with the Durant-Dort Carriage Co., under C. W. NASH. This company later became the Dort Motor Car Co. Before leaving this company Mr. Averill had become president and general manager. During this time he took a year's leave of absence to assist in organizing Chevrolet. In 1924 he took the position which he held until the time of his retirement.

ARTHUR F. WILSON, assistant production manager, Warner & Swasey Co., died July 13 at the age of 37.

WILLIAM C. MERRILL, president of the E. R. Merrill Spring Co., manufacturer of automobile springs, died July 19 from injuries sustained in an accident.

FRANK J. TUITE, engineer with the Robins Conveying Belt Co., died July 20, after a connection with the company of over 25 years.

SHOP EQUIPMENT NEWS



Ex-Cell-O Improved Series 35 Production Thread Grinders

Speed of the hydraulically operated work spindle of the Series 35 production thread grinders, recently improved by Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich., is infinitely variable. This permits setting the machine to operate at the speed most suitable for each job. Temperature control is provided for the coolant and an improved method of dressing the grinding wheel has been provided. The improved cam-type universal dresser permits dressing grinding wheels for external threads with U. S. standard, 60 deg. sharp, V, Acme, Whitworth and special thread forms.

A special internal grinding attachment is available for backing off hobs and similar operations. Grinding of taper threads in either direction of table travel up to 2 in. per ft. is accomplished by swiveling the table and correcting the lead by a simple adjustment of a hand knob on the front panel of the machine. Provision of a lead compensator also enables the grinding of screw threads having metric pitches.

Thread can be ground in both directions, this being made possible by an endwise shifting of the lead screw to take out all back-lash as the hydraulic motor driving the work spindle is reversed at the end of each stroke. This shift is accomplished with such speed that the work spindle and direction of cut may be reversed while the wheel is still in the cut.

Airco-DB No. 10 Light-Weight Radiograph

Air Reduction Sales Co., 60 E. 42nd St., New York, N. Y., has announced the development of the No. 10 "Radiagraph" for flame cutting steel slabs and plates. It will cut bevels up to 45 deg. without extra attachments. Square edges and straight lines of any length may be produced and complete circles up to 85 in. in diameter can be cut when using the radius rod and center point. Unit weighs 41 lb. and can be carried from job to job. A standard Airco-DB machine cutting torch is used. Cutting speed is adjustable from 4 to 60 in. per min. with an index speed control for quick setting.

American Type T Three-Way Broach

The Type T, three-way vertical hydraulic broaching machines announced by American Broach & Machine Co., Div. Sundstrand Machine Tool Co., Ann Arbor, Mich., can be used for surface broaching, pull-down internal broaching, and push-down internal broaching, pressing and assembly operations. Main column casting is provided with hardened and

ground steel ways which form the surfaces for the machine slide. This column also houses the hydraulic pump unit, which is submerged in oil.

Model T-4-24 has a normal capacity of 4 tons and a maximum capacity of 6 tons. Broaching speed of this unit is 30 ft. per min. and return speed is 45 ft. per min. Maximum stroke is 24 in. and rest plate measures 16 x 8½ in. The 6-ton Model T-6-24 has a maximum capacity of 9 tons and is provided with a broaching speed of 28 ft. per min. and a return speed of 44 ft. per min.

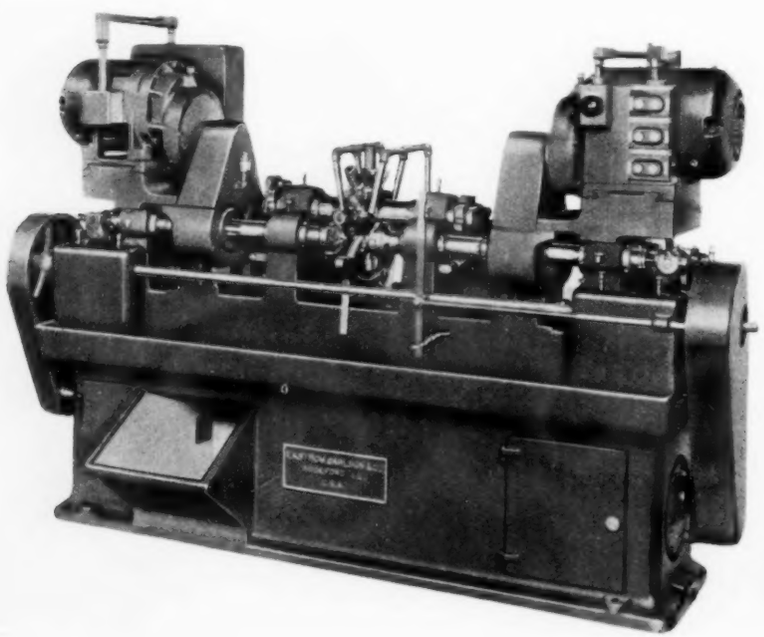
Thomson-Gibb Series G Welders

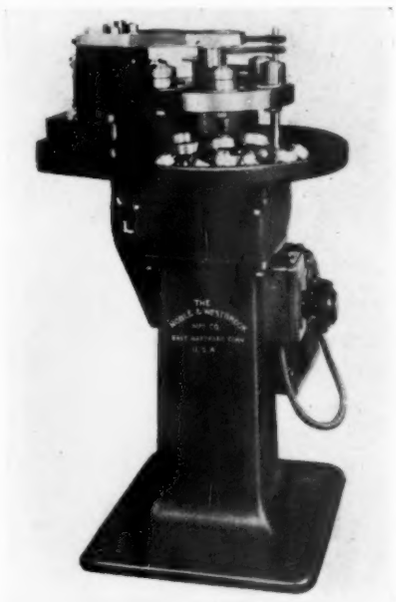
Available in three standard throat depths and four transformer capacities, the Series G motor-driven spot welders announced by Thomson-Gibb Electric Welding Co., 164 Pleasant St., Lynn, Mass., have a speed range wide enough to adapt them to the space of practically any production line. Throat depths are 12, 18 and 24 in., and transformer capacities are 20, 30, 40 or 60 kva. Welding pressure is variable from 200 to 800 lb. Speeds obtainable are 42, 53, 66, 81, 101 or 127 spots per min. Drive is from a ½ hp., 1,200 r.p.m. motor.

Ekstrom-Carlson Four-Spindle Automatic Turning Machine

Equipped with two spindles and heads for rough turning and two spindles with heads for finish turning, this four-spindle automatic turning machine announced by Ekstrom, Carlson & Co., 1439 Railroad Ave., Rockford, Ill., is shown arranged for completely finished turning both ends of a universal joint yoke in one pass through the machine. Two geared-head motors are fitted with sprockets and silent chains for driving the four spindles. A third geared-head motor is mounted inside the column for feeding the cutterheads to the work.

Cutting tools are flooded with cutting compound supplied by a pump driven by belt from the feed shaft. The eight-station indexing head and locking mechanism is operated from the feed motor and is timed to allow the four spindles to complete the operation and return before the cycle is repeated. Machine is equipped with starting buttons for each motor and a master emergency stop button which shuts off the current on all three motors. Machine weighs approximately 5,000 lb. and requires 94 x 44 in. floor space. It is 60 in. high.



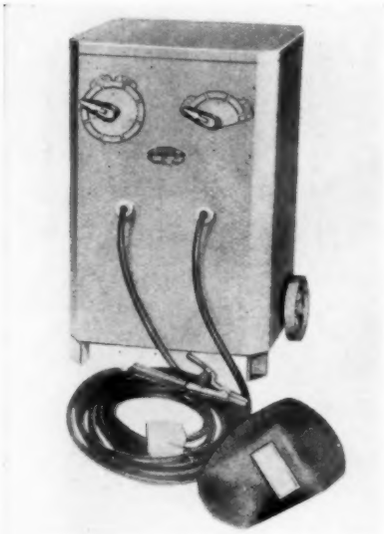


N. & W. No. 21-H Production Marker

An overarm support for the dial spindle is featured in the No. 21-H heavy duty production marking machine announced by The Noble & Westbrook Mfg. Co., 20 Westbrook St., East Hartford, Conn. Two roller bearing rings are marked in one operation on this machine. The holder carrying the two marking dies has a vertical adjustment, as well as an in-and-out adjustment for depth of impression or for marking rings of different diameters. Production is approximately 120 pieces per min.

"Giant Grip" Portable Heavy-Duty Welder

A portable a.c. arc welder for heavy-duty service has been announced by Giant Grip Mfg. Co., Oshkosh, Wis. This model has two dials on the front of the cabinet for current control. Construction includes a specially designed transformer, reactance control, static high frequency current, a number of heat controls, and

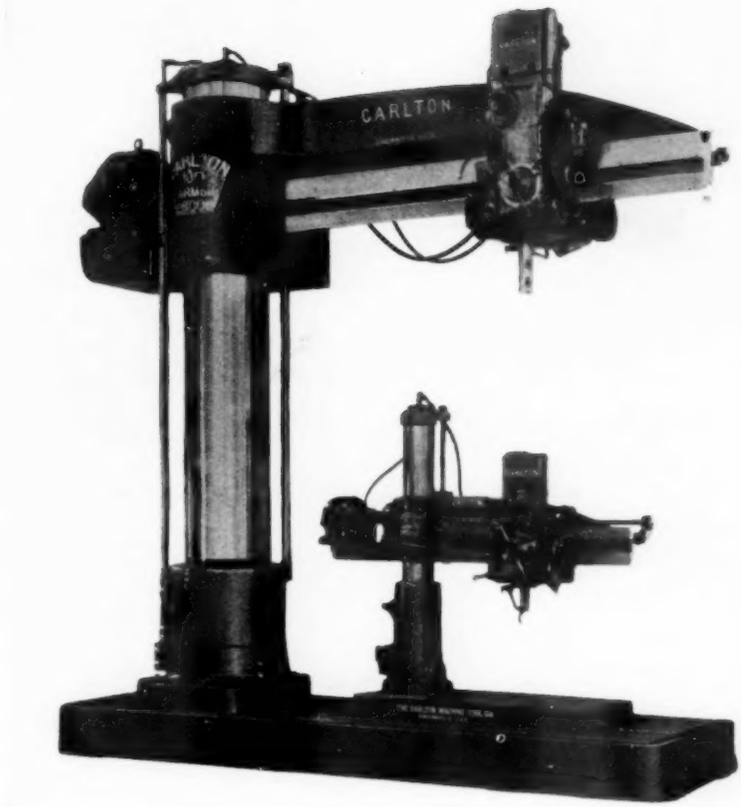


a cooling arrangement that is claimed to eliminate hot-spots in the coils. Welding range is from 10 to 165-300 amp. depending on the model selected. Three sizes are available.

Oliver No. 103 Pattern Miller

Wood and soft metals can be machined with the No. 103 Universal Pattern Miller, announced by Oliver Machinery Co., Grand Rapids, Mich. Table is arranged for transverse and longitudinal movements, and is mounted on a ball-bearing swivel carriage which is fitted with a taper plunger that will lock the table at

every 15 deg. Table measures 20 x 24 in. and is drilled and tapped for clamp bolts. On top of the column is a ¾ hp. motor which operates the screw for raising and lowering the cutter arm. By changing the V-belts which drive the spindle, spindle speeds of 4,000, 2,900, 2,000 and 1,450 r.p.m. can be obtained.

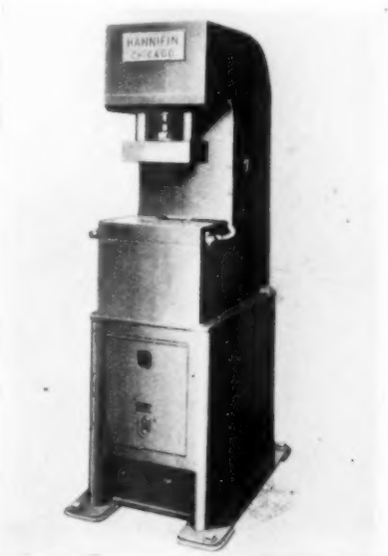


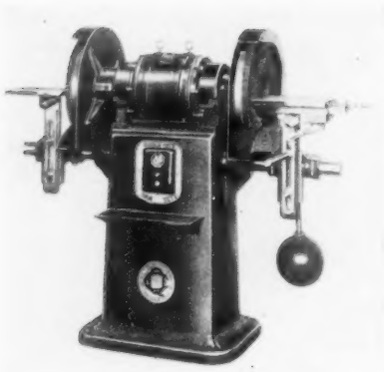
Carlton 26-In. Column Radial Drills

Available with 8, 9, 10, 11 and 12 ft. arms, the 26-in. diameter column radial drills announced by the Carlton Machine Tool Co., Cincinnati, Ohio, can be furnished with any type of table or bases for production work. Ball bearing head has forced lubrication and a wide range of speeds and feeds. Head is power rapid traversed by an individual motor and it also is provided with a motor for raising and lowering the arm. Another motor locks the arm around the column, while the column is clamped by an electric-hydraulic unit. Dual control is provided so that the machine can be operated from the head, or from the skirt of the column when the arm is in a high position. Illustration shows a standard 4-ft. arm, 9 in. column radial drill on the table of one of the 10-ft. arm, 26-in. column units.

Hannifin "Hy-Power" Hydraulic Presses

Available in capacities from 12½ to 60 tons, the high-speed semi-automatic hydraulic presses announced by Hannifin Manufacturing Co., 621 S. Kolmar Ave., Chicago, Ill., are equipped with "Hy-Power" operating units. Press shown has a capacity of 12½ tons and the complete operating cycle is approximately 2 sec. "Hy-Power" hydraulic operation provides an automatically completed press cycle which includes rapid advance until the die touches the work, automatic high pressure working stroke, automatic reversal at maximum pressure and rapid return.





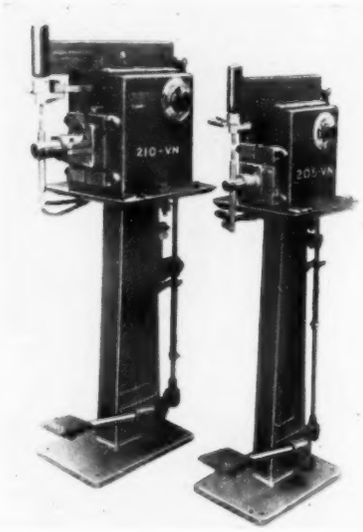
"Queen City" Heavy-Duty Disk Grinders

Two heavy-duty disk grinders powered with ball bearing motors are offered by Queen City Machine Tool Co., 217 E. Second St., Cincinnati, Ohio. The No. 318 grinder is powered with a 3-hp. motor while the No. 518 machine has a 5 hp. motor. Rocker shaft on which the tables are mounted has a 26-in. bearing in the column and is of one piece.

Both machines use 18x1 in. steel disk wheels and operate at 1200 r.p.m. Height of spindle from floor is 41¼ in. and the machines require a floor space of 6x6 ft. Net weight is 1,278 or 1,362 lb., depending on the size of the motor.

Binks No. P-54 Fluid Pump

Arranged so as to be readily changed from one drum to another, the No. P-54 fluid circulating pump, offered by Binks Mfg. Co., 3114–26 Carroll Ave., Chicago, Ill., is operated by electric or air motor drive. It will deliver clear lacquer, varnish and other non-pigmented finishing materials from the original shipping container to the spray gun. Pump, motor, relief valve and fluid feed regulator are mounted on a steel baseplate.

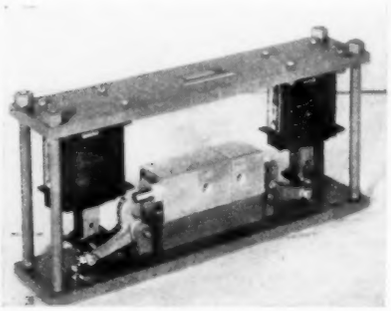


Eisler Improved Spot Welders

Ranging in size from 1 to 35 kva., the vertical-acting Type VN spot welders announced by Eisler Engineering Co., 745 S. 13th St., Newark, N. J., are supplied in foot, air and power operated models. Plunger action of the upper electrode is said to give extreme accuracy in the spot welding operation. The No. 205-VN and the No. 210-VN models shown are of 5 and 10 kva. capacity respectively and have been used for welding electrodes to sparkplug shells.

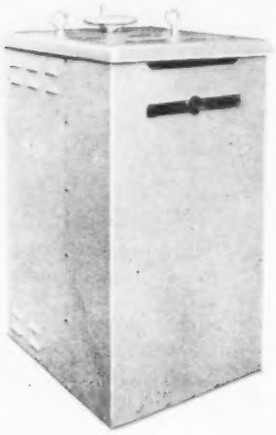
Hunt Double-Solenoid Air Control Valve

A four-way, double-solenoid high-speed air control valve for use with cylinders 3 in. in diameter or smaller and with correspondingly short strokes has been developed by C. B. Hunt & Son, Salem, Ohio. This valve is made in one size only and is suitable for air pressures up to 200 lb. per sq.in. Valving action is accomplished with but a single moving part.



G.E. Atomic-Hydrogen Type WHB Arc Welder

Improved atomic-hydrogen arc-welding equipment for special alloys and thin sections has been announced by General Electric Co., Schenectady, N. Y. This equipment is useful where a fusion weld is required; it produces a uniformly strong weld, free from porosity and with smooth appearance. The Type WHB unit shown has an over-all height of 38 in. and is available in 35, 75, and 150 amp. sizes.



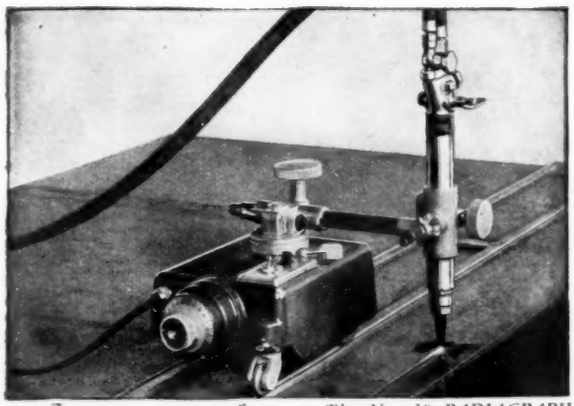
C.-H. Bulletin 9560 Magnetic Contactors

Bulletin 9560 a.c. magnetic contactors for small, continuous-duty motors have been announced by Cutler-Hammer, Inc., 205 N. 12th St., Milwaukee, Wis. All moving parts are pivoted and the self-aligning armature is said to eliminate

The New AIRCO-DB No. 10 RADIAGRAPH

The No. 10 RADIAGRAPH with radius rod and center point (standard equipment) cutting an arc with beveled edge. Note the clean face and sharp edges (untouched) of the cut.

A great little gas cutting machine that most shops need — and can afford to buy!



The No. 10 RADIAGRAPH cutting a straight line with square edge. One section of track for cuts up to 5 ft. long is standard equipment. Using an additional length of track, uninterrupted cuts of unlimited length can be made.

PRICE COMPLETE
$125.00
F.O.B. ANY AIRCO DISTRICT OFFICE IN U. S. A.
Price includes the machine proper, torch adjusting unit, standard AIRCO-DB Machine Cutting Torch, Radius Rod and Center Point and one length of Track.

Every shop that cuts steel sheets, plates and forgings for welded fabrication, or bevels them for gas or electric welding, needs this truly portable, motor-driven machine, because it speeds up and cuts the cost of these operations . . . and its very reasonable price puts it within the means of practically any shop.

HERE'S WHAT THE NO. 10 RADIAGRAPH WILL DO

1. Cut straight lines of any length, with either square or beveled edges. *(No extra attachment required for bevel cutting.)*
2. Cut circles ranging from 3" to 85" in diameter, with either square or beveled edges.
3. Cut arcs up to 42½" radius, with either square or beveled edges.
4. Cut irregular outlines to a limited degree by manual operation of the torch adjusting arm.

MAIL THE COUPON FOR COMPLETE DETAILS

The No. 10 RADIAGRAPH Bulletin, fresh from the press, tells the whole story of this remarkable little machine—the biggest value ever offered in a gas cutting machine. Mail the coupon for your copy—today.

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Send me a copy of the No. 10 RADIAGRAPH Bulletin. AM-7

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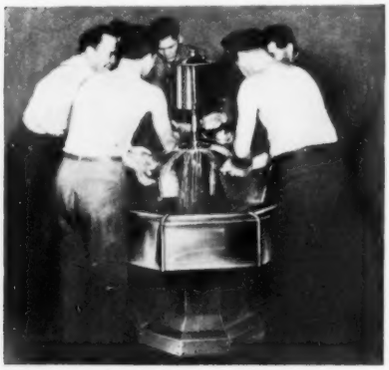
sliding friction. These contactors are available in two, three and four-pole constructions with maximum ratings of 1½ hp. for single phase and 2 hp. for polyphase service.

Bonney Type CC Roller Tool Cabinet

Double-door Type CC Roller Tool Cabinet announced by Bonney Forge & Tool Works, Allentown, Pa., is 28 in. long, 13 in. wide and 27 in. high. Without tools or metal box for tools, it weighs 50 lb. A single door model, the Type C roller cabinet is 24 in. long, 12 in. wide and 27 in. high and weighs 40 lb. without tools or metal box.

S.B.P. "Groupwash" Wash Fountains

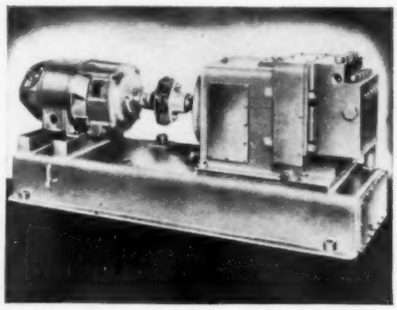
"Groupwash" stainless steel fountains offered by Sugar Beet Products Co., Saginaw, Mich., are of ten-sided design, permitting ten workers to use a single unit at the same time. The



mixing assembly, spray head and spray control is operated by turning any one of the five handles located on the side of the fountain head. A type KS soap dispenser is available for mounting on this fountain.

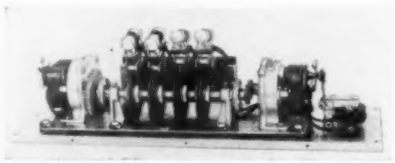
W.-S. "Uniflo" Hydraulic Pump

"Uniflo" pumps developed by The Watson-Stillman Co., 75 West St., New York, N. Y., combine the "swash-plate" form of operating mechanism with conventional packed plunger and poppet valve features. Pumps up to 7½ hp. are designed with five plungers, larger sizes have seven plungers. These pumps are available in standard sizes from 2 to 100 hp. for pressures of 1,500 lb. per sq. in. and upward. They will handle oil, water or other hydraulic medium. Sizes up to 25 hp. can be furnished with variable delivery through the use of a variable speed transmission.



"Staley" Two-Speed Re-Cycling Controller

A two-speed, multiple-circuit recycling time controller has been developed by the Electric Switch Corp., Columbus, Ind. Listed as the Staley Model 635 controller, this unit util-



izes varied speeds on its single camshaft. Motors with different speeds are placed at either end of the camshaft and, using speed reducers and over-riding clutches at proper places on the shaft, the cycling operation is accelerated or slowed down at any point desired in the cycle.

Wilson Screwless Fiber Lamp Guard

Shock-proof "Wilson" fiber lamp guards, announced by Safeguard Electric Co. Inc., 1 DeKalb Ave., Brooklyn, N. Y., are constructed of heavy flexible vulcanized fiber and have a swivelled fiber hook to hold

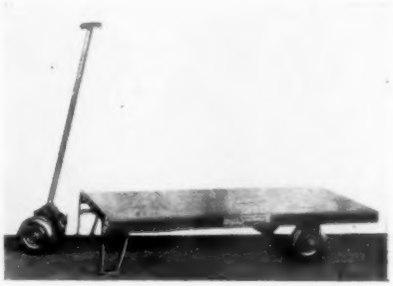
the guard in any position. Lamp seals into the top of the rubber handle and the extension cable seals in the bottom of the handle. No tools are necessary to remove the lamp from the guard.

Walton Offers Tap Extractor Sets

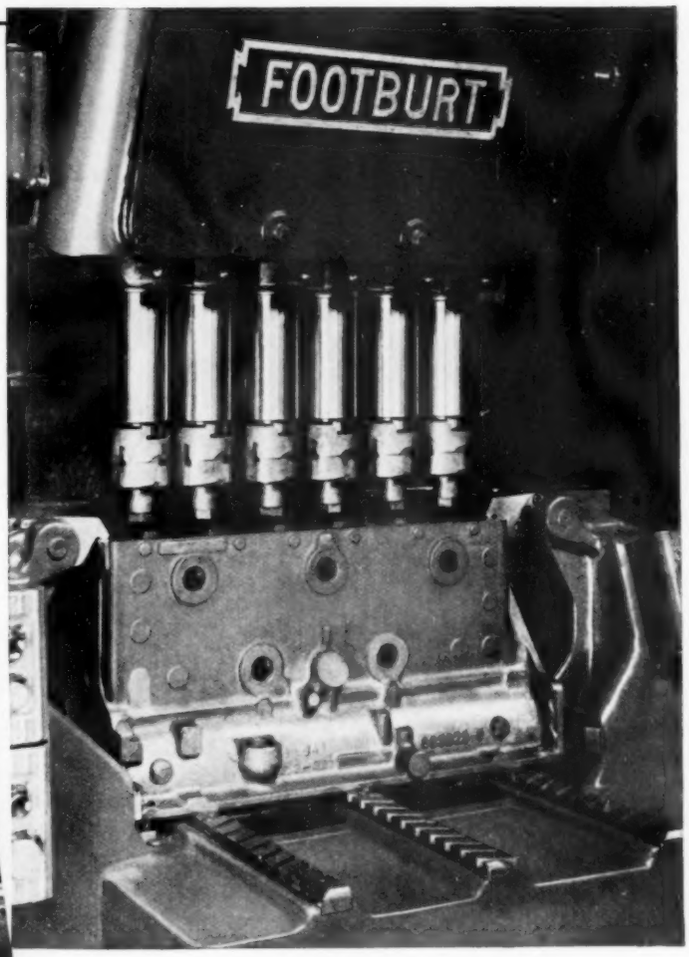
Tap extractor sets, made up of 4, 5 or 6 different size extractors, are offered in polished wood cases by The Walton Co., 96 Allyn St., Hartford, Conn. These extractors are available in 2, 3 and 4-flute styles. Bulletin No. 132 lists standard and special sizes.

Lewis-Shepard Offers "Jack-Master" Trucks

The "Jack-Master" semi-live skid system for handling materials consists of one or more skids and a lifting unit. Offered by Lewis-Shepard Sales Corp., 117 Walnut

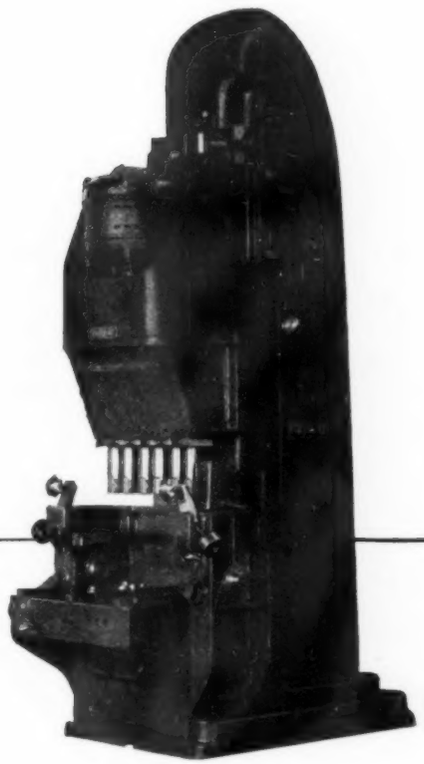


ACCURATE MACHINES *for* ACCURATE PRODUCTION BORING



6-Spindle Stub Type Hydraulic Feed Cylinder Boring Machine

ACCURACY is always the keynote in the manufacture of Footburt machines. Results prove the great importance of this accuracy in boring automotive cylinders which are bored by the millions every year on Footburt equipment. We would like an opportunity to make recommendations on the use of stub boring for your cylinder boring work.



FOOTBURT

THE FOOTE-BURT COMPANY

CLEVELAND, OHIO

Detroit Office:
4-151 General Motors Bldg.

Chicago Office:
565 Washington Blvd.

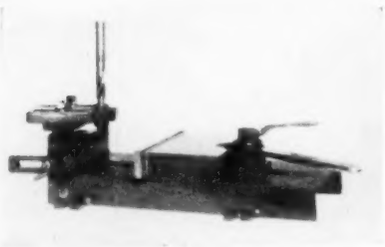
St., Watertown, Boston, Mass., these units have capacity ranging from 2,500 to 3,500 lb. Operator lifts load by pulling down on the handle at the lifting unit. Weight of the load automatically shifts from the handle to the axle. Skids have 7½ in. under clearance and may be used with regular hand or electric lift trucks. Further details are listed in Circular No. 606.

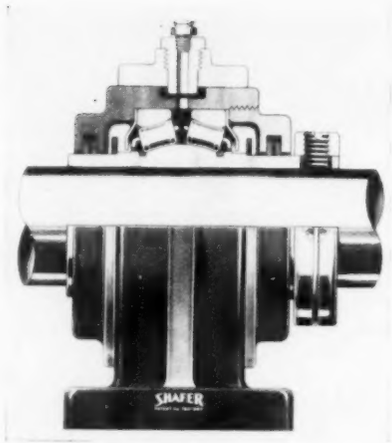
MSA Chemical-Type Industrial Respirators

Efficient and comfortable protection against harmful gases and vapors given off during paint spraying operations, as well as light concentrations of organic and acid gases occurring singly or in combinations, is said to be provided by chemical-cartridge type respirators offered by the Mine Safety Appliances Co., Braddock, Thomas and Meade St., Pittsburgh, Pa. Cartridges with three different fills are available; the proper fill depending upon the class of vapors or gases encountered.

M. & C. All-Steel Fabricated Vise

Furnished with or without drill jig attachment, the fabricated all-steel vise announced by Miller & Crowningshield, Greenfield, Mass., regularly is made in a 9-in. size. This vise has a jaw depth of 2 in., opens 10½ in., and weighs 60 lb. The quick-action lock is operated with a cam.



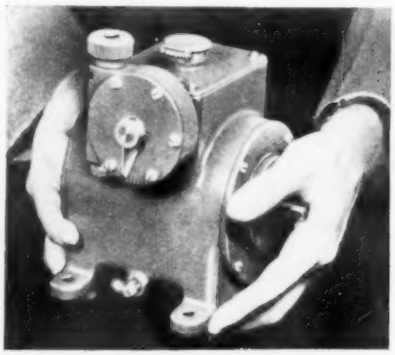


Shafer "Super-Sealed" Pillow Blocks

A line of heavy-duty "super-sealed" pillow blocks announced by Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill., employs welded-steel housing construction and provides full protection against severe dirt conditions. Complete listings of dimensions and load ratings for these pillow blocks, which are available in $1\frac{7}{16}$ to $3\frac{15}{16}$ in. shaft sizes, are given in Bulletin No. 521.

Graham Model 25 Variable Transmission

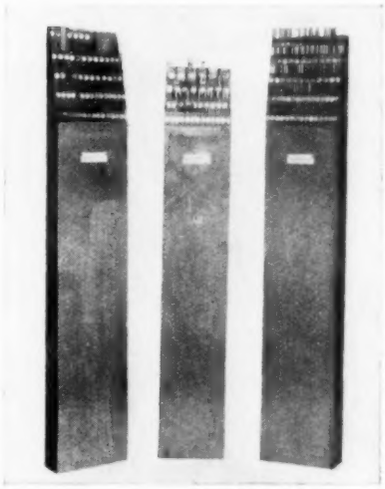
Improved models of the previously described (*A.M.*—Vol. 80, page 971) variable speed transmission built by Graham Transmissions, Inc., 2711 N. 13th St., Milwaukee, Wis., now are available. Model 25 unit shown measures 5x8 in. and is



infinitely adjustable. These transmissions now are available in sizes ranging from 1/6 to 15 hp. and are arranged for coupling to standard motors, or with the motor mounted on the transmission case. Full motor power is transmitted over a speed range of 4 to 1. Other features are described in Bulletin No. 307.

Curran Drill Rod Storage Racks

All lengths of drill rod up to 3 ft. can be stored in the compartment tubes of the drill rod storage racks offered by Curran Machine Works, 31-25 45th St., Long Island City, N. Y. Over-all dimensions of these racks are 3½x8x45 in. Individual square tubes mounted in these racks are 34 in. long, so that a 36-in drill rod extends 2 in. Each tube is closed at the bottom. The tube can be removed from the rack and up-ended to secure short lengths of any size of rod.



Oster 2-In. Power Pipe Vise Stand

A pipe vise stand equipped with a power unit and chuck which enables the user to thread, cut and ream all sizes of pipe up to 2 in. by power is offered by the Oster Mfg. Co., 2057 E. 61st Place, Cleveland, Ohio. The pipe is gripped in a universal, bar-operated, scroll type chuck and is revolved by the power unit concealed in the upper part of the stand.

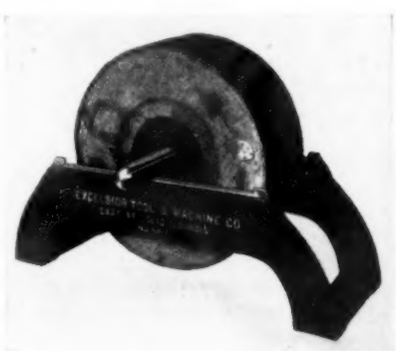
Universal, variable speed 110-volt motor geared to the spindle holding the chuck gives spindle speeds from 14 to 32 r.p.m. according to the load of the cut.

"IPCO" Chrome Leather Welding Helmet

Designed for use by electric welders in tight places where the conventional style shield requires too much space, the "IPCO" chrome leather welding helmet announced by Industrial Products Co., 800 W. Somerset St., Philadelphia, Pa., has a flip-front glass holder which can be raised instantly for weld inspection. Made of selected chrome leather, on a specially constructed vulcanized fibre head gear, this helmet is adjustable to various head sizes without the use of tools.

Excelsior No. 98 Balancing Stand

Developed for balancing grinding and polishing wheels, the No. 98 balancing stand offered by Excelsior Tool & Machine Co., 32nd St. and Ridge Ave., E. St. Louis, Ill., has capacity for wheels 18 in. in diameter and 7 in. wide. The top surfaces consist of 1x¾ in. hardened and ground tool steel inserts.

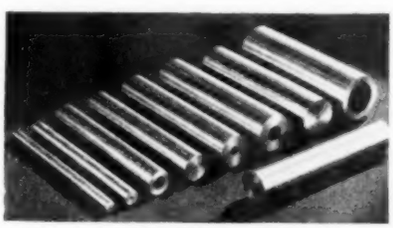


Benjamin Hinged Reflector Covers

"Dust-Tight" hinged glass covers are offered by Benjamin Electric Mfg. Co., 120-128 S. Sangamon St., Des Plaines, Ill., for mounting on all circular Benjamin reflectors having a beaded edge where the lamp does not project below the reflector bead. They can be fitted to reflectors ranging from 8 to 22 in. in diameter.

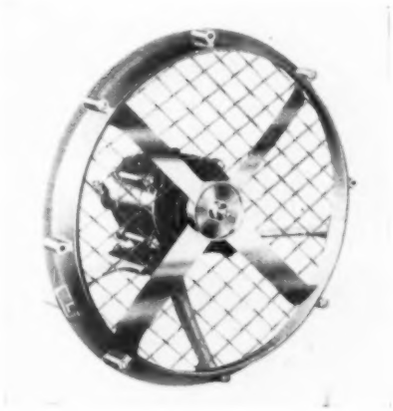
Bunting No. 72 Bronze Bars

A line of cored and solid bronze bars listed as "Precision Bronze Bars" have been announced by the Bunting Brass & Bronze Co., 738 Spencer St., Toledo, Ohio. Known as Bunting No. 72 and as S.A.E. 660, this metal is claimed to have ample strength to resist heavy loads and to perform satisfactorily under adverse operating conditions. More than 240 sizes are carried in stock.



Ideal No. 1 "Handy" Soldering Tool

Ideal Commutator Dresser Co., 1057 Park Ave., Sycamore, Ill., offers the No. 1 "Handy" thermo-grip electric soldering tool, for light soldering on small work. The soldering unit is 6½ in. long by $\frac{5}{16}$ in. in diameter, and consists of a handle holding two heating carbons, one fixed and the other movable against a spring.



DeVilbiss Type JG Exhaust Fans

Type JG exhaust fans, designed to effect rapid movement of a large volume of free air, have been announced by the DeVilbiss Co., Toledo, Ohio. These fans are available with ¼ or ½ hp. direct-connected, ball bearing, explosion-proof electric motors, are suitable for use with spray-finishing equipment and for other exhaust purposes wherever a general vapor, fume or dust condition prevails.

Jackson Offers Welding Eyeshield

A cover-all eyeshield consisting of a comfortable, light-weight head gear which is attached to an assembly consisting of a lens frame and two side

protection members, is offered by the Jackson Electrode Holder Co., 6553 Woodward Ave., Detroit, Mich., for use on a wide range of welding operations. Lens frame swivels to adjust

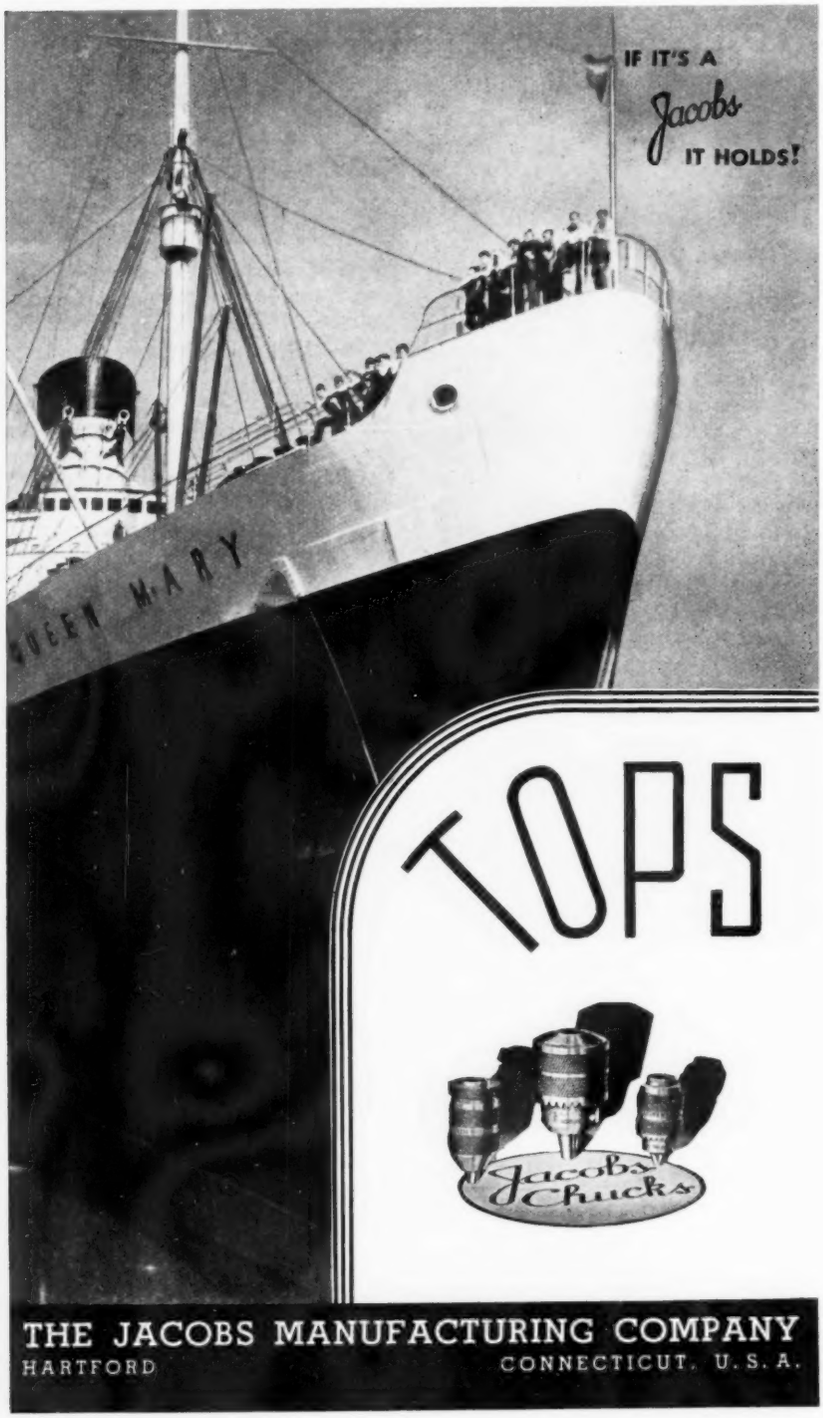
the lens angle and provision is made for easy adjustment of the distance of the lens from the face.

Glyco "Flexo C" Adhesive Wax

Glyco Products Co., Inc., 148 Lafayette St., New York, N. Y. has announced development of "Flexo C" wax which is said to exhibit high adhesive properties even on glass and metals. It is non-crystalline and has high water-repellent properties. It blends easily with resins, oils and other waxes and the adhesive properties are said to make it suitable for application on tool handles to prevent slipping.

P-B Commercial Ball Bearings

Developed primarily for roller conveyor and trolleys, a line of commercial ball bearings, offered by Palmer-Bee Co., Detroit, Mich., is adaptable to casters, dollies, hand trucks, turntables and similar uses. Capacities range from 30 to 2,250 lb. per bearing. Inner ball race is made of cold drawn steel and the bore is broached hexagonally to form a lock on hexagon axles. Outer race is coined to give a burnished surface to the raceway. These bearings are made in outside diameters ranging from $\frac{7}{8}$ to $3\frac{9}{16}$ in. for assembly with $\frac{5}{16}$ to $1\frac{1}{4}$ in. hexagon shafts. Six different types of seals are available for use with these bearings.



H.-V. W.-M. Glass Cloth Plating Anode Bags

Glass cloth anode bags, announced by the Hanson-Van Winkle-Munning Co., Matawan, N. J., are of one-piece tubular construction and are claimed to outlast any cloth bag. These bags are recommended for all acid and for many alkaline plating solutions.

G.E. "Deltabeston" Glass Insulated Wire

A fiber-glass insulated "Deltabeston" magnet wire is offered by General Electric Co., Schenectady, N. Y., as an addition to the present line of "Deltabeston" asbestos-insulated magnet wire. This glass-insulated magnet wire is available in round, square and rectangular shapes.

M. & W. "Duart" Wrinkle Enamels

"Duart" wrinkle enamels, announced by Maas and Waldstein Co., 438 Riverside Ave., Newark, N. J., can be supplied in every color, including white and light pastel shades. It is claimed that practically no discoloration occurs during baking process. These finishes are light in body and can be sprayed like synthetic enamel.

B. & L. Lead-Bearing Open Hearth Steel

A lead-bearing, open hearth steel recently announced by Bliss & Laughlin, Inc., Harvey, Ill., is said to offer a combination of qualities that permits a high rate of production on automatic screw machines. The lead addition increases the machinability of the steel without affecting its physical properties in any other way.

TRADE PUBLICATIONS

ALUMINUM FINISH Bulletin No. 15 S.A., offered by Hilo Varnish Corp., 42–60 Stewart Ave., Brooklyn, N. Y., discusses the features of "Aluminum Sparkle Rip-Pl" finishes and shows color strips of the various colors obtainable.

BEARINGS The Bound Brook Oilless Bearing Co., Bound Brook, N. J., has started publication of "The Reservoir," a house organ dealing with various bearing products offered by the company. Vol. 1, No. 1, is dated June, 1938.

COLD DRAWN STEEL A 24-page illustrated handbook entitled "Cutting Costs with Cold Drawn Steel" is offered by the Union Drawn Steel Div., Republic Steel Corp., Cleveland, Ohio. This booklet outlines the advantages of cold drawn steel and is designed to serve as a guide in the selection of this material for various applications.

COLD DRAWN STEEL Wyckoff Drawn Steel Co., Pittsburgh, Pa., has issued a new four-page bulletin discussing the characteristics of "Ledloy" cold drawn steel.

CONTROLLERS Folder No. 89-9, announced by the Brown Instrument Co., Wayne & Roberts Ave., Philadelphia, Pa., discusses the features of air-operated controllers for industrial processing applications.

CONVEYOR CHAINS Bulletin No. 65, offered by the Baldwin-Duckworth Chain Corp., Springfield, Mass., discusses the features of machine finished conveyor chains and tabulates standard dimensions for a number of types of chains and sprockets.

CONVEYORS Palmer-Bee Co., Detroit, Mich., has announced publication of a 96-page handbook on roller conveyors. This book includes tables and charts, as well as descriptions, specifications and prices on a full line of roller conveyor units.

DUST CONTROL "Old Man Silicosis Is On the Run" is the title of a four-page bulletin describing the "Centri-Merge" dust arrester offered by the Schmieg Sheet Metal Works, 312-320 Piquette Ave., Detroit, Mich.

ELECTRIC CABLES Features of "Tricord" electric cords and cables are discussed in a circular, No. TRI-1050, now being distributed by the Triangle Conduit & Cable Co., Inc., Elmhurst, New York, N. Y.

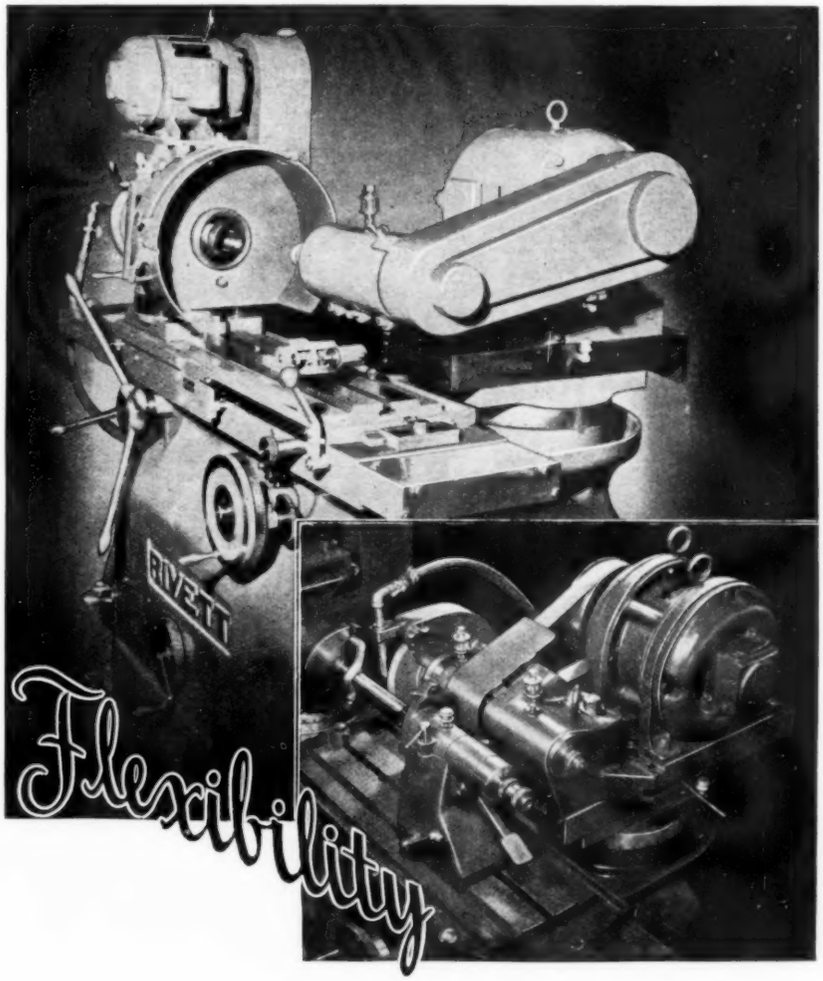
EYE PROTECTION "How to Fit Eye-Protection Goggles to Workers for Greatest Comfort and Safety" is the title of a pamphlet offered by American Optical Co., Southbridge, Mass.

FLAME HARDENING Bulletin No. 3813A, an illustrated booklet entitled "Flame Hardening," has been published by the Linde Air Products Co., 205 E. 42nd St., New York, N. Y.

FLAME CUTTING Features of the Airco-DB No. 10 Radiagraph are discussed in a bulletin offered by Air Reduction Sales Co., 60 E. 42nd St., New York, N. Y.

GEAR HOBBER The Type D hydraulic hobbing machine, developed by Barber-Colman Co., Rockford, Ill., is described in a four-page bulletin recently published.

FLEXIBLE COUPLINGS Catalog No. 38, announced by Poole Foundry & Machine Co., Westbury, Balti-



No. 112 UNIVERSAL GRINDER

Primarily is for medium and large internal and external tool-room grinding, straight, bevel, two angle or straight and bevel at one setting. Wide range of adjustments makes it effective on a great variety of work while its extreme simplicity of design enables any mechanic to operate it. Complete specifications sent on request.

RIVETT LATHE & GRINDER INC.
BRIGHTON, BOSTON, MASS.

more, Md., describes the features of Poole all-metal flexible couplings. Dimensions of standard types are tabulated for reference.

GRINDING FIXTURES Noyes Tool Sales Co., 601 Laurel Ave., Bridgeport, Conn., is distributing a bulletin in which is discussed the use of the Noyes carbide tool grinding fixtures, which are designed for use with bench-type grinders.

HEATING ELEMENTS Use of horizontal gas-fired radiant tube heating elements for every phase of heat treating is discussed in a four-page bulletin, Form No. SC-80, announced by Surface Combustion Corp., Toledo, Ohio. Photographs show recent installations.

HIGH-TENSILE STEELS An eight-page booklet recently published by Carnegie-Illinois Steel Corp., 434 Fifth Ave., Pittsburgh, Pa., gives technical information of interest to engineers, as well as a general discussion of the advantages, applications and fabrication of U. S. high-tensile steels.

HYDRAULIC COUPLINGS Bulletin No. 3219, offered by Hydraulic Coupling Div., American Blower Corp., 632 Fisher Bldg., Detroit, Mich., discusses the features of hydraulic couplings and points out some recent industrial applications.

LATHE OPERATION South Bend Lathe Works, 279 E. Madison St., South Bend, Ind., announces publication of the 34th edition of the machinist's manual "How to Run a Lathe." This edition has 128 pages and contains more than 350 illustrations. Price 25 cents per copy.

INDUCTION MOTORS A 6-page bulletin discussing the features of polyphase induction motors is offered by the Burke Electric Co., Erie, Pa.

KEY SYSTEMS A chart showing the possibilities of master-key systems is offered by the Stamford Div., The Yale & Towne Mfg. Co., Stamford, Conn. Sketches show various styles of locks.

KOPPERS YEAR BOOK The story of Koppers Co., Koppers Bldg., Pittsburgh, Pa., is told in "Koppers Yearbook—1938" recently published.

LEDLOY STEEL Characteristics of "Ledloy" lead-bearing open hearth free cutting steel are discussed in a four-page bulletin offered by the Inland Steel Co., 38 S. Dearborn St., Chicago, Ill. Ask for Bulletin No. 50.

LIGHTING UNITS Canopy-type units for localized, diffused lighting of high intensity are described in Catalog No. M.L.11 announced by The Fostoria Pressed Steel Corp., Fostoria, Ohio.

LINCONDITIONER Bulletin No. 329, offered by the Lincoln Electric Co., Cleveland, Ohio, describes the "Linconditioner" for removing dirt particles from the air, removing the heat of the welding operations and filtering out dirt and smoke to improve shop conditions.

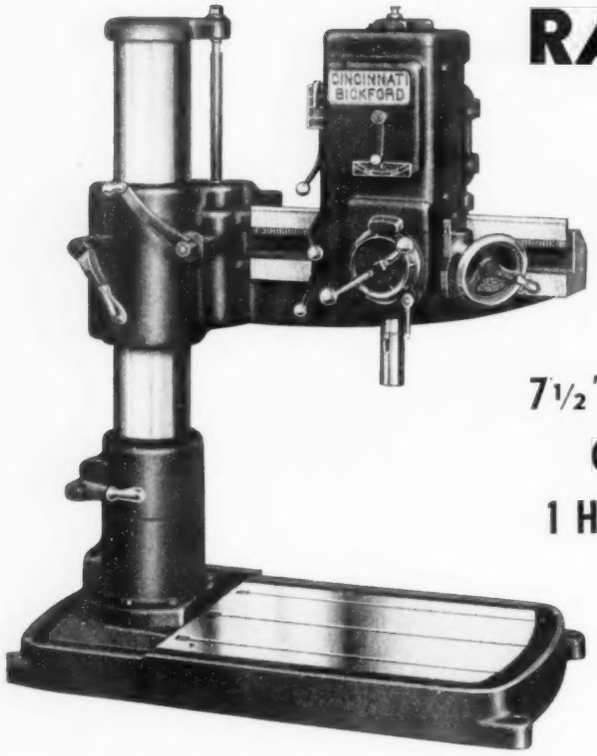
MAGNETS Bulletin No. 25, offered by Stearns Magnetic Mfg. Co., Milwaukee, Wis., gives features of circular, rectangular and hand magnets.

MOLYBDENUM A loose-leaf data book entitled "Molybdenum in Steel" has been published by Climax Molybdenum Co., 500 Fifth Ave., New York, N. Y. Data includes information regarding physical properties, fabrication and heat-treatment of various steels containing molybdenum.

NEW 2½'

SUPER-SERVICE

RADIAL



7½" DIAMETER
COLUMN
1 H.P. MOTOR

A NEW Radial Drill for production drilling of small holes. Economically replaces large upright drills or belt driven sensitive radials.

FEATURES—

Simplified Head—Pick-off gears—Automatic oiling — Anti-friction bearings — Multiple splined integral key shafts — Head mounted on ball bearing rollers and hardened steel armway — Single lever controls 3 power feeds by means of sliding chrome nickel steel gears — 3 or 6 spindle speeds.

This new Super-Service Radial will pull a 1" drill in cast iron, or a ¾" drill in steel.

Write for full particulars and advantages of power and floor space requirements, size, economy and ease of handling. Ask for Bulletin R-26.

THE CINCINNATI BICKFORD TOOL CO.
OAKLEY CINCINNATI OHIO U.S.A.

NICKEL CAST IRON The International Nickel Co., Inc., 67 Wall St., New York, N. Y., has published a 1938 revision of Nickel Cast Iron Data sheets, Section 1, No. 1, entitled "Guide to the Selection of Engineering Specifications for Grey Cast Iron."

PANTOGRAPH MACHINES An instruction book and parts catalog for all Gorton pantograph machines is offered by George Gorton Machine Co., Racine, Wis. This 48-page booklet, Form No. 1385-A, gives assembly and parts drawings, as well as installation and operation instructions.

PERSONNEL The May, 1938, issue of the Engineering Bulletin published by Purdue University, Lafayette, Ind., and entitled "Personal and Industrial Relations," is a report of the proceedings of the Industrial Personnel Institute held at the University, June 28-July 3, 1937.

PILLOW BLOCKS Bulletin No. 521, offered by Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill., discusses the features of and lists specifications for "Super Sealed" pillow blocks for heavy-duty applications. These pillow blocks are furnished with a welded steel frame and are available in fixed and expansion types.

PRESS ACCESSORIES Bulletin No. 20 offered by U. S. Tool Co., Inc., Ampere, East Orange, N. J., is titled "Automatic Press Room Equipment" and discusses the features of standard and special slide feeds, roll feeds, stock oilers, power-driven straighteners, stock reels and automatic cutoff units.

PUNCH PRESSES "The Ferracute Field," a new house organ announced by the Ferracute Machine Co., Dept. F., Bridgeton, N. J., is being published in the interest of the company's customers and representatives. Vol 1, No. 1, is dated June 15, 1938.

SHEET METAL Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y., is distributing an 8-page bulletin in which illustrations show the use of Niagara presses, shears and other machines for sheet metal working in various plants for shearing, blanking, drawing and forming plate and metal sheets.

STEEL CASTINGS Facilities maintained by the National-Erie Corp., Erie, Pa., for the production of rough, finished and heat-treated steel castings of a wide range of sizes and physical characteristics is discussed in a 24-page, fully illustrated bulletin recently published. Ask for bulletin No. 5.

SOLDER POT The "Junior" solder and melting pot developed by The Newton Junior Corp., 151 Court St., New Haven, Conn., is described in a four-page circular recently announced.

SPRING MAKING A 4-page bulletin announced by the Torrington Mfg. Co., Torrington, Conn., discusses the features of an improved line of spring-making machines and tabulates specifications for both segment and clutch type coiling machines.

UNIVERSAL GRINDERS Features of Type C hydraulic universal grinders are discussed in two catalog bulletins recently published by Landis Tool Co., Waynesboro, Pa. Bulletin No. J-38 describes the 10x24 in. grinder, while Bulletin No. J-138 describes the 12-in. machines.

VIBRATION CONTROL Reprints of the paper "Theory of Vibration Con-

New 48-page illustrated booklet entitled "The Story of Sulphurized Cutting Oils" now available to personnel of metal working plants. Please write to 2727 South Troy Street, Chicago, for your free copy using company letterhead and stating capacity.

trol" presented by S. Rosenzweig, president, The Korfund Co., at the A.S.M.E. meeting at Dallas, Tex., on June 7 are being distributed by The Korfund Co., Inc., Long Island City, N. Y.

WELDING TIPS P. R. Mallory & Co., 3031 E. Washington St., Indianapolis, Ind., announces a catalog describing a new pointed welding tip as well as a recently standardized line of spot welding tips and water-cooled tip holders.

PATENTS

May 24, 1938

Metal-Working Machinery

Routering Machine. John E. Alvard and John H. Moore, Detroit, Mich. Patent 2,118,063.

Press (Hydraulic). Paul V. J. Merenda, Fontenay-aux-Roses, France, assigned to The Turner Tanning Machinery Co., Portland, Me. Patent 2,118,098.

Machine for Grinding Flutes. Stanley W. Bath, Shrewsbury, and Ervin L. Ackley, Worcester, Mass., assigned to John Bath & Co., Worcester, Mass. Patent 2,118,139.

Disk Rolling Apparatus. Axel B. Pearson, Munhall, Pa. Patent 2,118,224.

Vertical Spindle Milling Machine. Newman M. Marsilius, Bridgeport, Conn., assigned to The Bridgeport Bronze Co., Bridgeport, Conn. Patent 2,118,259.

Crankshaft Milling Machine. Newman M. Marsilius, Bridgeport, Conn., assigned to The Bridgeport Bronze Co., Bridgeport, Conn. Patent 2,118,260.

Arc Welding Unit. Roland R. Vollman, Cincinnati, Ohio, assigned to The Commonwealth Mfg. Co., Cincinnati, Ohio. Patent 2,118,291.

Grinding Machine. Carl J. Hertlein, Brooklyn, N. Y., assigned to Franz Fuchs, Brooklyn, N. Y. Patent 2,118,304.

Machine Tool (Miller). Fred A. Parsons, Milwaukee, Wis., and Walter M. Pohl, Washington, D. C., assigned to Kearney & Trecker Corp., West Allis, Wis. Patent 2,118,357 and 2,118,358.

Machine for Grinding Laminated Articles. Edgar D. Vancil, Cincinnati, Ohio, assigned to Cincinnati Grinders, Inc., Cincinnati, Ohio. Patent 2,118,369.

Throated Gear Shaping Machine. Edward W. Miller, Springfield, Vt., assigned to The Fellows Gear Shaper Co., Springfield, Vt. Patent 2,118,453.

Lathe. Lionel A. Carter, Webster Groves, Mo. Patent 2,118,489.

Duplicating Routing Machine. Carl H. Johnson, Bridgeport, Conn. Patent 2,118,514.

Slotting Machine. Louis G. Larsen, Jersey City, N. J., assigned to Wirthsen Associates, Inc., New York, N. Y. Patent 2,118,515.

Polishing and Buffing Machine. Gustave A. Carlson, Detroit, Mich. Patent 2,118,548.

Parts and Mechanisms

Seal for Bearing Mechanisms. Thomas Barish, Jamestown, N. Y., assigned to Marlin-Rockwell Corp., Jamestown, N. Y. Patent 2,118,027.

Universal Coupling. Florence C. Biggert, Jr., Crafton, Pa., assigned to United Engineering & Foundry Co., Pittsburgh, Pa. Patent 2,118,028.

Drilling Spindle Drive for Vertical Drilling Machines. Georg Robert Wölffe, Berlin-Pankow, Germany, assigned to Herbert Lindner, Berlin-Wittenau, Germany. Patent 2,118,387.

Variable Speed Gear with Centrifugal Control. August Timmermann, New York, N. Y. Patent 2,118,423.

Centrifugal Torque Converter. Bjarne Ellefsen, Brooklyn, N. Y. Patent 2,118,439.

Sheet Metal Punching Apparatus. Frederick H. Johnson, Detroit, Mich. Patent 2,118,648.

Pulley Clutch. Albert E. McGowan, Carlisle, Pa. Patent 2,118,734.

Processes

Coating on Aluminum (Protective). James W. Newsome, New Kensington, Pa., assigned to Aluminum Co. of America, Pittsburgh, Pa. Patent 2,118,053.

Process of Demagnetizing. Foster B. Doane, Pittsburgh, Pa., assigned to Magnaflux Corp., Pittsburgh, Pa. Patent 2,118,174.

Method of Making a Welded Spherical Vessel. Frederick K. Zerbe, Waukesha, Wis., assigned to A. O. Smith Corp., Milwaukee, Wis. Patent 2,118,388.

Method for Forming Shapes from Sheet Metal. Malcolm C. Durbin, Jamaica, N. Y. Patent 2,118,499.

Process and Apparatus for Mounting Crankpins and the Like. Henry A. Bergert, Canton, Ohio, assigned to The Timken Roller Bearing Co., Canton, Ohio. Patent 2,118,755.

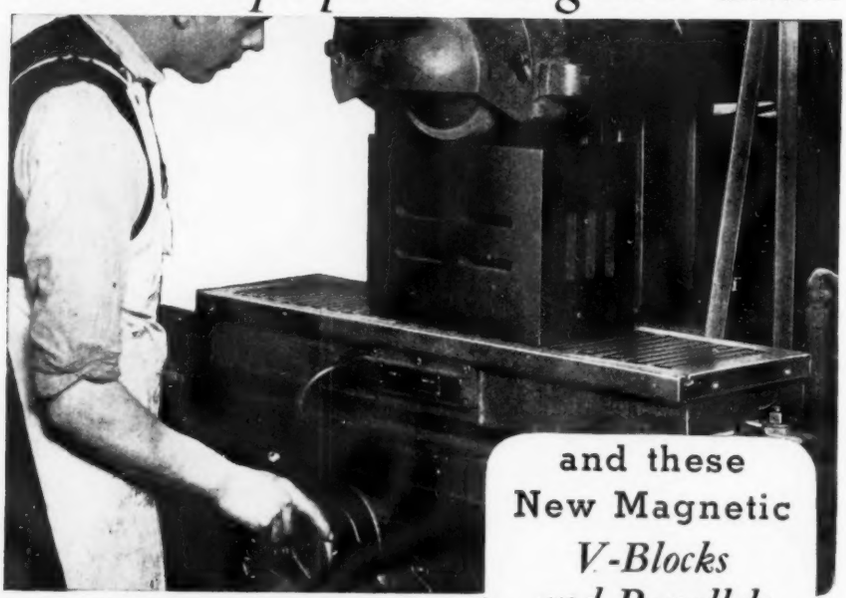
Tools and Accessories

Adjustable Depth Chuck (Drill). Frederick Russel Brown, Brooklyn, N. Y., assigned to American Machine & Foundry Co., New Jersey. Patent 2,118,485.

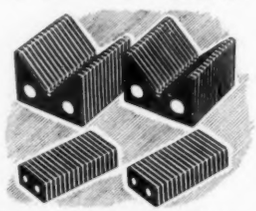
Cylinder Surfacing Tool (Hone). Herman W. Zimmerman, North Chicago, Ill., assigned to Automotive Maintenance Machinery Co., North Chicago, Ill. Patent 2,118,720.

Apparatus for Use in Effecting Adjustments of Roller Bearing Parts. Henry A. Bergert, Canton, Ohio, assigned to The Timken Roller Bearing Co., Canton, Ohio. Patents 2,118,754 and 2,118,756.

WIDER RANGE
of Set-Up
with a Superpower Magnetic Chuck



and these
New Magnetic
V-Blocks
and Parallels



These tools extend work-range in grinding or machining irregular-shaped parts. They carry the chuck's magnetic power well above face plate level. Applicable to any style or model of chuck. Stocked in these sizes:

T-P Magnetic Parallels	*T-P Magnetic V-Blocks*
¾ x 1½ x 3"	2½ x 2½ x 1¾"
1 x 2 x 4"	

Special sizes on application.

LET us show you how to increase the output, not only of grinders, but of shapers, planers, and millers, as well — with Superpower Magnetic Chucks. The services of our magnetic chuck engineers are available without charge.

THE TAFT-PEIRCE MFG. CO.

Woonsocket T-P *Rhode Island*

Take it to TAFT-PEIRCE for Contract Manufacture, Design, Tooling, Gages, Set-Up and Inspection Tools